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KNOWLEDGE ECONOMY FORUM IX
BERLIN, GERMANY, MAY 5-7, 2010

Diversification through Innovation: Prospects for Growth

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Diversification through Innovation: Prospects for Growth

GEFÖRDERT VOM

Bundesministerium
für Bildung
und Forschung

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BACKGROUND

The Knowledge Economy Forum (KEF) is the most important annual World Bank conference for the regions of Central and Eastern Europe, Russia, the Commonwealth of Independent States and Central Asia (ECA). The conference focuses on innovation management, international science-business networks as well as current developments in the target region. Moreover, the KEF addresses issues of knowledge and technology transfer, international innovation networks, and reforms aiming at strengthening the competitiveness of the region. The KEF is an exclusive event; participants range from ministers and high-level government officials of national and re-gional ministries of economics and research to distinguished representatives of industry, internationally renowned universities, and research institutions.

The annual multiday conference is jointly hosted by the World Bank and a partner organization from the respective host country. For the 2010 Berlin Forum on "Diversification through Innovation: Prospects for Growth", the World Bank worked closely with the Fraunhofer Center for Central and Eastern Europe (MOEZ). The MOEZ is the strategic partner of industry, research, and politics for networking and collaboration with policy makers in Central and Eastern European growth markets. The institute focuses on fundamental transformation processes in a globalized world, such as the development towards a knowledge economy, global shifts in value creation processes, and the growing need to pursue sustainable development strategies at regional and international levels.

The primary objectives of the 9th Knowledge Economy Forum were:

1. The design and development of policies to improve the effectiveness and efficiency of national innovation systems through economic diversification, the modernization of higher education institutions, and the support of commercialization of national R&D.

2. Discussions on the potential impact and finetuning of diversification policies via an exchange of experiences among international experts, representatives of government entities, research institutions and business constituencies from ECA and advanced EU countries.

3. A strengthening of the dialogue and coordination between clients, donors, and multilateral organizations to improve the relevance and quality of technical assistance (TA) and operational support on all initiatives related to promoting innovation-driven growth.

The KEF IX was organized along two key themes, namely "Diversification" and "Showcasing the German Enterprise and Research Sector".

As ECA countries are striving to devise paths to emerge from the economic crisis, some have realized their vulnerability in remaining largely resource-driven economies. There is a growing need for diversification and an acceptance of supporting knowledge-driven growth. In this context, the KEF sought to formulate policy proposals for economic diversification.

Professors Ricardo Hausmann and Bill Maloney discussed Diversification Strategies during Plenary Session II on May 5, 2010. Other high-level discussants of a related "Hard Talk" panel discussion included the Deputy Prime Minister and Minister of Science of Serbia, Mr. Bozidar Djelic, and the Minister of Economy of Armenia, Mr. Nerses Yeritsyan. The foundation of this session was provided by an overview of the economic impact of the crisis on the ECA region; in particular, its effects on innovation and R&D activity at the enterprise level throughout the region.

As a next step, the Forum explored the case of the German Mittelstand SME sector, focusing on support policies and programs that have enabled innovation-driven development

within the context of German unification. In this regard, the discussion addressed the German research and innovation system and its ability to effectively link publicly financed research with the needs of a dynamic private sector. Distinguished speakers, including the Presidents of the Max Planck and Fraunhofer Societies and the German Academy of Science and Engineering, provided an overview of the research system during Plenary Session VIII on May 6, 2010.

This topic had also been at the core of the previous KEF (VIII), where the discussion had focused on the reform of public Research and Development Institutes (RDIs) in ECA countries.

Plenary Session VII addressed the transition of EU policies from the Lisbon Agenda to the EU 2020 Strategy, discussing the future of R&D, higher education, and innovation policies as enablers for competitiveness. Speakers included Gerard de Graaf of the European Commission as well as the Minister of Education and Science of Lithuania, Mr. Gintaras Steponavieius.

The audience consisted of ministerial expert-level representatives from various kinds of ministries (primarily economics, industry and trade; science and technology; research and education; finance); heads of R&D institutions as well as incubation support and technology transfer programs; reform-minded leaders of higher education institutions; dynamic private sector representatives interested in influencing the dialogue on the relevance of public research and innovative skill match; specialists in areas addressed by the forum; young entrepreneurs and scientists form the ECA client countries; and representatives of civil society.

The organizers had invited delegations from across the ECA region to attend KEF IX including participants from Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, FYR Macedonia, Georgia, Hungary, Kazakhstan, Kosovo, Kyrgyz Republic, Latvia, Lithuania, Moldova, Montenegro, Poland, Romania, the Russian Federation, Serbia, Slovakia, Slovenia, Tajikistan, Turkey, Ukraine, Turkmenistan and Uzbekistan.

Presentations have been taken from the website: www.knowledgeeconomy.com

Photo: Prof. Dr. Hans-Jörg Bullinger, President of the Fraunhofer-Gesellschaft

CONTENT

THEME 1: DIVERSIFICATION IN A POST-CRISIS WORLD

Plenary I: Impact of the Crisis on Innovation

This session provided an overview of post-crisis trends in the Europe and Central Asia (ECA) region, examining their implications for the development of the innovation agenda and R&D investment in the region. The session was led by World Bank ECA Chief Economist Indermit Gill, who discussed the prospects for further economic growth in the region and strategies for recovery. He was followed by Paulo Guilherme Correa, who presented the findings of a regional enterprise survey, which exhibited the effects of the crisis on the promotion of innovation by the private sector in the region. Ksenia Yudaeva of Sberbank then shared with the audience a case study on the effects of the crisis on Russian banks and innovation financing.

Innovation in a Fiscally Strapped Environment

Indermit Gill, Chief Economist, ECA, World Bank
Igill@worldbank.org

Indermit Gill outlined the situation of fiscal divergence (concerning deficits, revenues and expenditures) in the ECA countries before, during and after the crisis.

Before the crisis, deficits were shrinking and in some countries even surpluses were recorded. ECA countries experienced high growth rates and an improving fiscal position due to good fiscal policies (with the exception of the EU-10 countries, where the fiscal position deteriorated slightly after their EU accession).

During the crisis, divergence increased. In Europe, some countries already recorded huge deficits, whereas some Mediterranean countries had only medium-size deficits and some (especially the oil exporting countries) had almost no deficit. However, huge increases in debt levels were recorded almost everywhere. Energy exporting countries employed high fiscal stimuli (rainfall funds), whereas all other ECA countries had no or only very small stimulus programs.

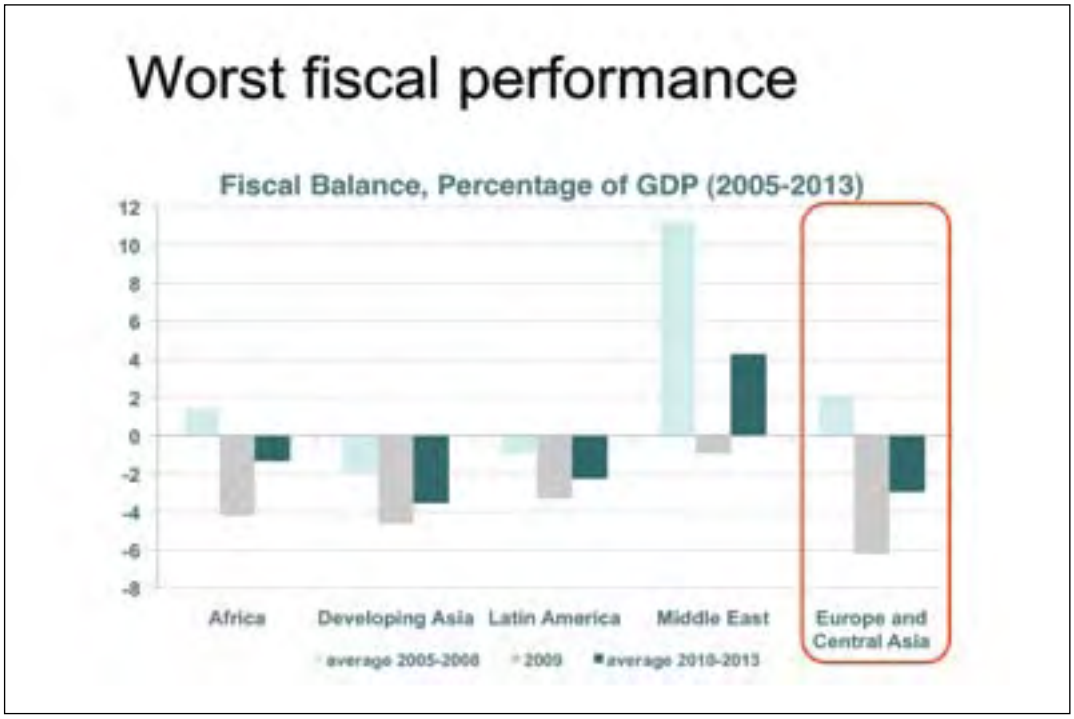
For the post-crisis period (2010 to 2015), a further increase in divergences can be forecast. In comparison to previous medium-term forecasts, the outlook for growth is much more subdued after the crisis. All in all, spending needs (on education, infrastructure etc.) will stay high, but revenues will not grow fast. Therefore, fiscal consolidation is urgently needed. Fiscal reforms need to be geared to individual problems; in the Western ECA region social systems are very costly, in Eastern countries energy subsidies are particularly problematic.

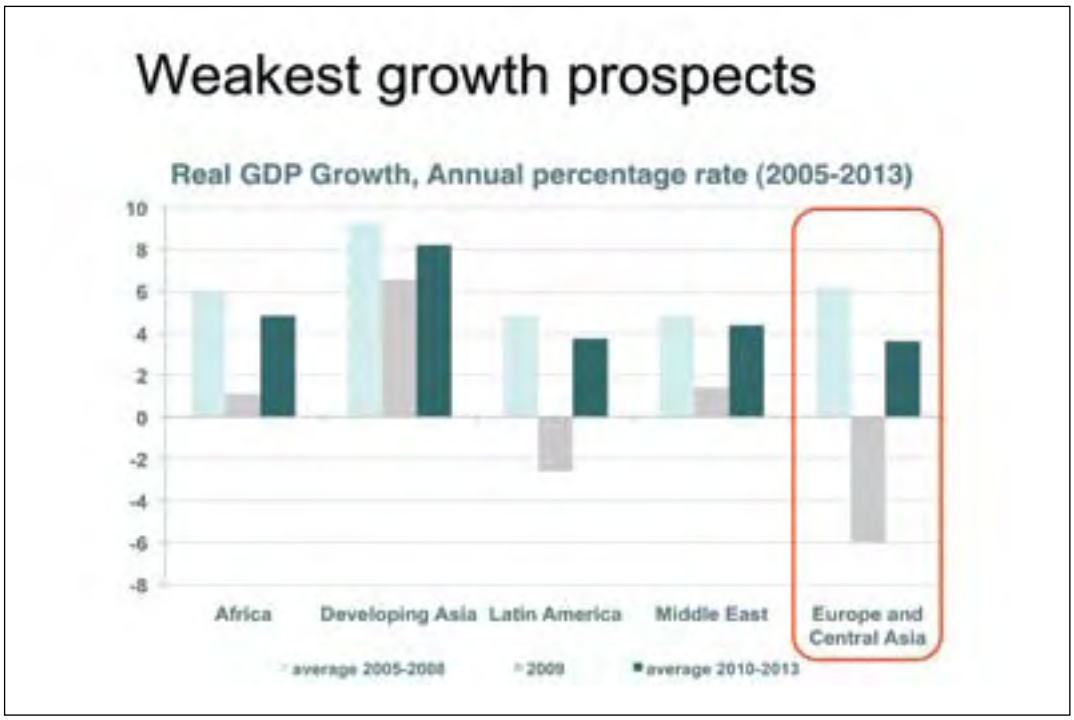
Main points

1. Before the crisis, fiscal performance improved across the region
   - Revenues rose, deficits fell, and fiscal policies improved with few exceptions
2. During the crisis, fiscal policy responses differed in the east and west
   - Reliance on automatic stabilizers in most countries
   - Fiscal stimulus programs in resource-rich economies.
3. After the crisis, fiscal adjustment priorities will be even more differentiated
   - Education and infrastructure in much of region
   - Social insurance in Central and Southern Europe
   - Reducing stimulus and energy subsidies in middle-income Former Soviet Union

Backdrop

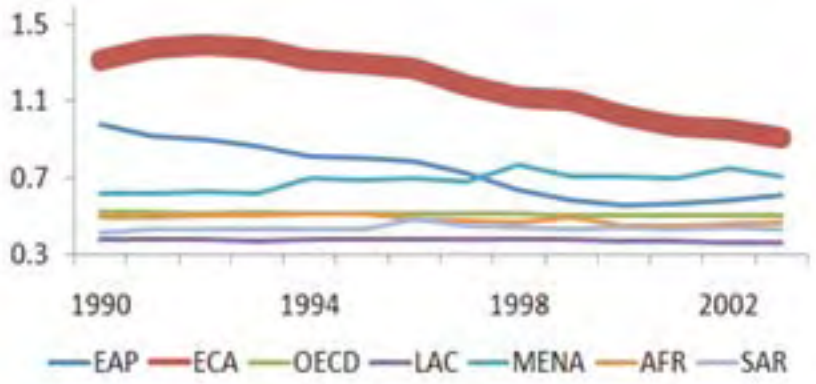
- **Emerging Europe and Central Asia hit harder than other developing regions**
- **Growth and fiscal prospects for the region are bleaker than for others**
- **The region also has a daunting climate action agenda**


Worst fiscal performance
Fiscal Balance, Percentage of GDP (2005-2013)
12
10
8
6
4
2
0
-2
-4
-6
-8
Africa
Developing Asia
Latin America
Middle East
Europe and Central Asia
average 2005-2008
2009
average 2010-2013


Weakest growth prospects
Real GDP Growth, Annual percentage rate (2005-2013)
10
8
6
4
2
0
-2
-4
-6
-8
Africa
Developing Asia
Latin America
Middle East
Europe and Central Asia
average 2005-2008
2009
average 2010-2013

Highest energy intensity

Energy intensity of GDP (kilotons per GDP PPP, $, 2000)

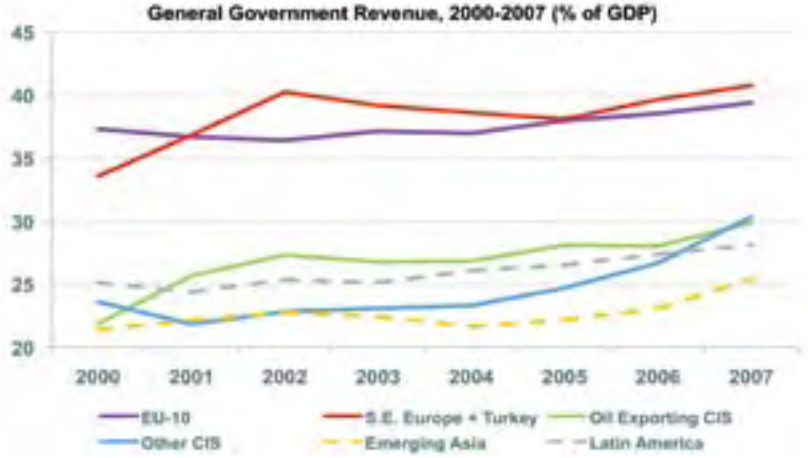


Before the crisis

- Revenues rose rapidly as trade and consumption based tax collections increased
- Spending rose almost as fast in aggregate, but steady as share of GDP
- Fiscal balances improved across the region, with a few exceptions (Hungary and Georgia)
- But budgeting and spending efficiency did not improve as much

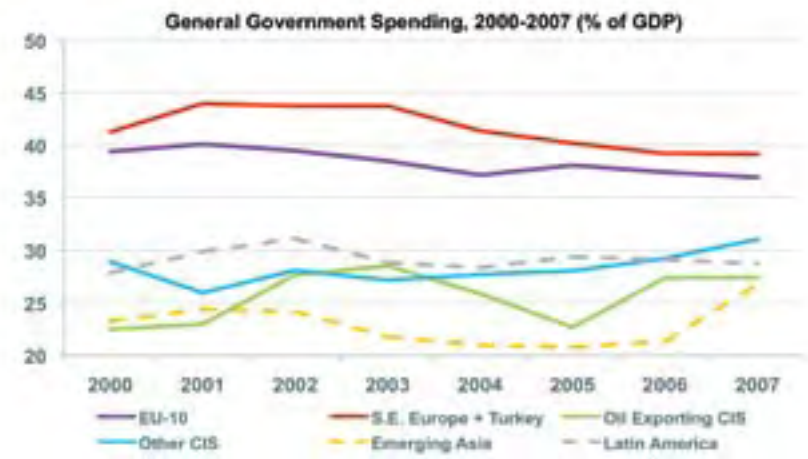
Revenues rose

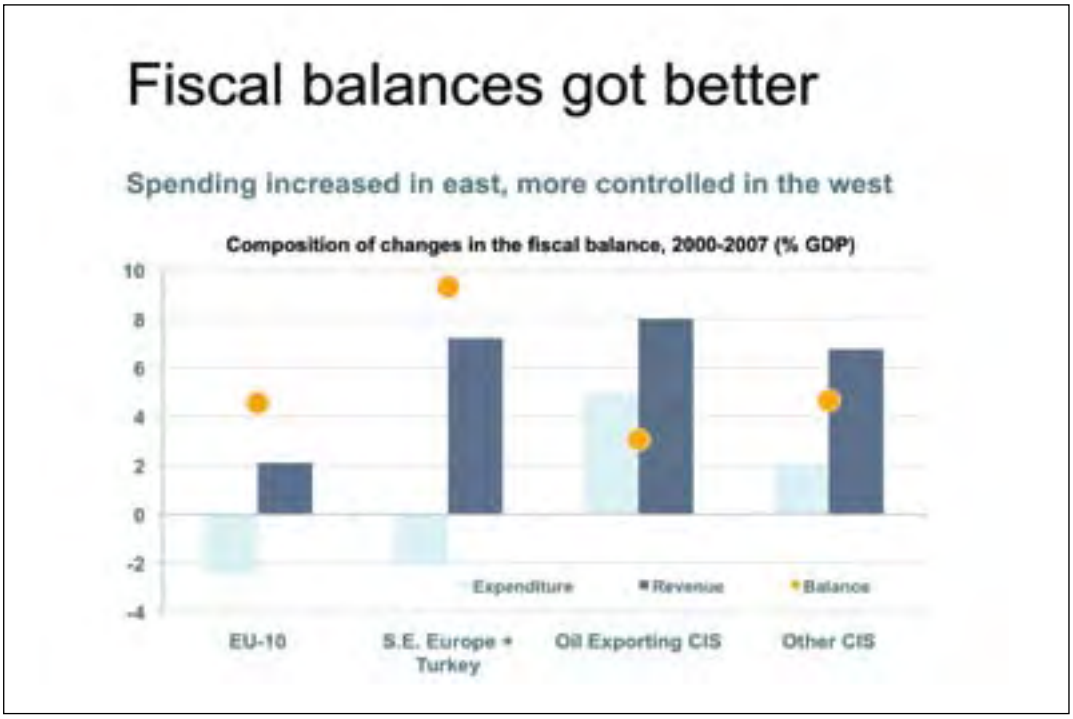
Steady increase as share of GDP, but aggregate increased from $700bn in 2000 to $1.2 trillion in 2007

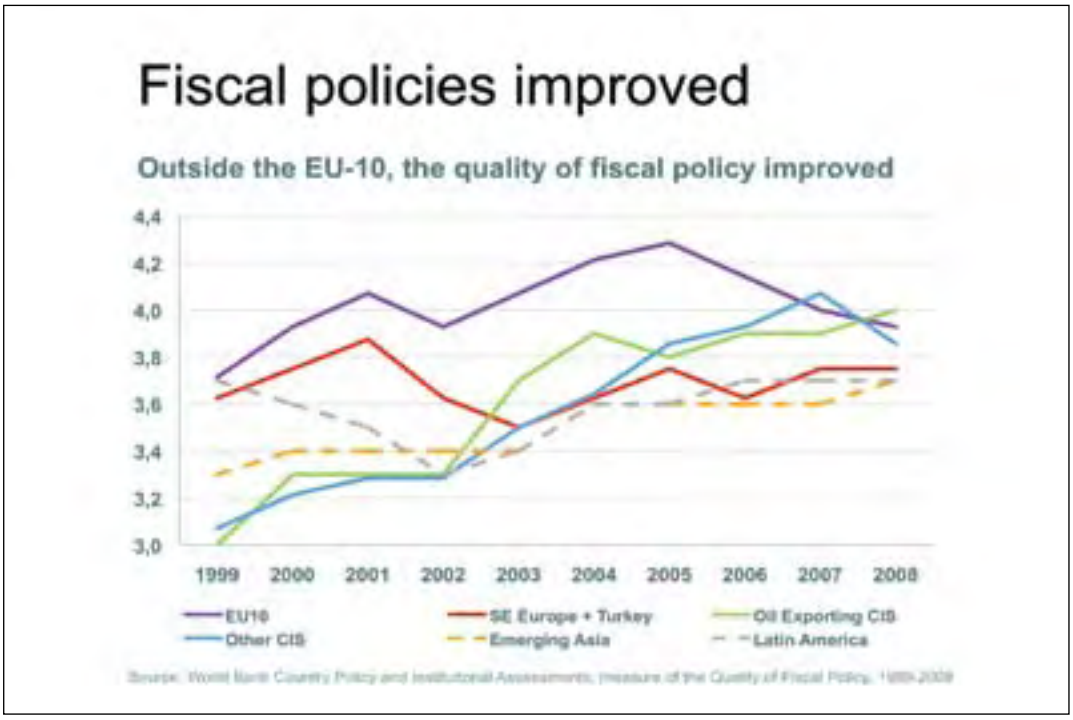


Spending up almost as much

Steady as a share of GDP, but rose in aggregate from $700 billion to $1.1 trillion

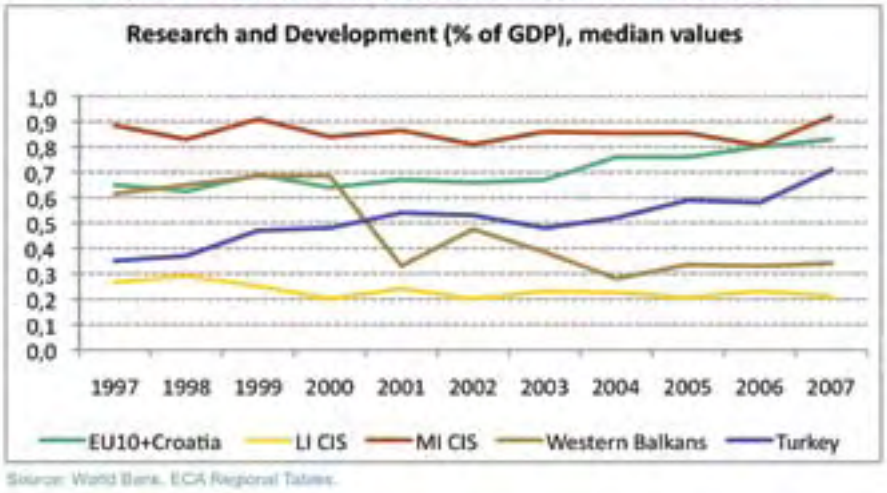



Fiscal balances got better
Spending increased in east, more controlled in the west
Composition of changes in the fiscal balance, 2000-2007 (% GDP)
10
8
6
4
2
0
-2
-4
Expenditure
Revenue
Balance
EU-10
S.E. Europe + Turkey
Oil Exporting CIS
Other CIS


Fiscal policies improved
Outside the EU-10, the quality of fiscal policy improved
4,4
4,2
4,0
3,8
3,6
3,4
3,2
3,0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
EU10
SE Europe + Turkey
Oil Exporting CIS
Other CIS
Emerging Asia
Latin America

Public R&D spending rose

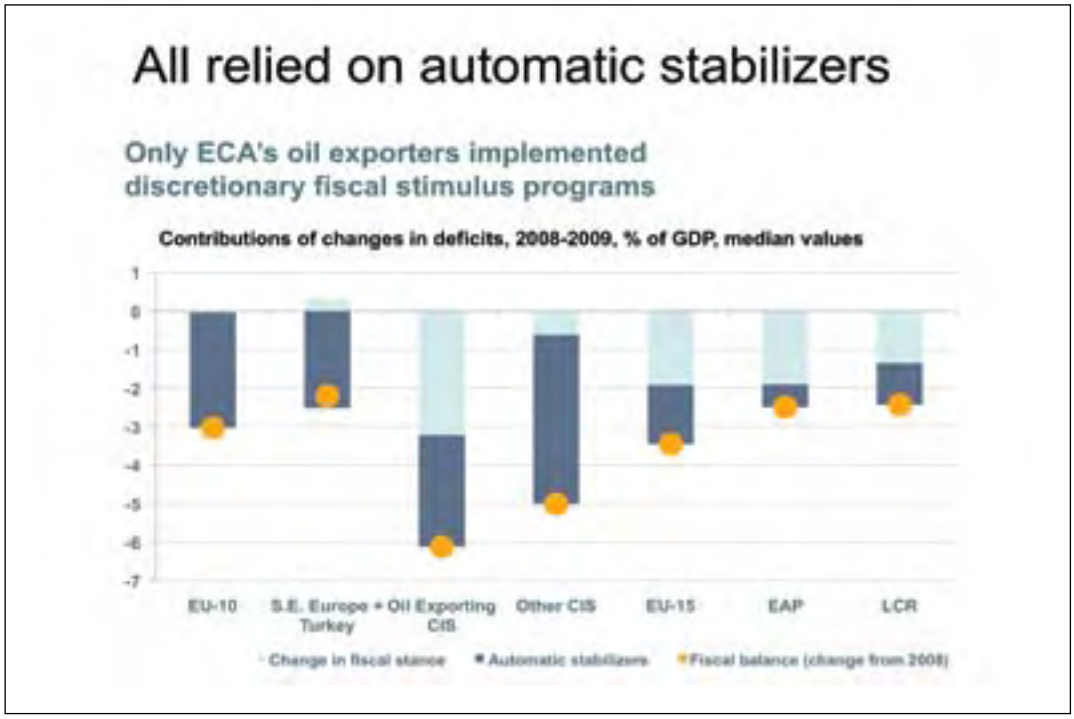
In the EU-10 and Turkey, spending on R&D increased

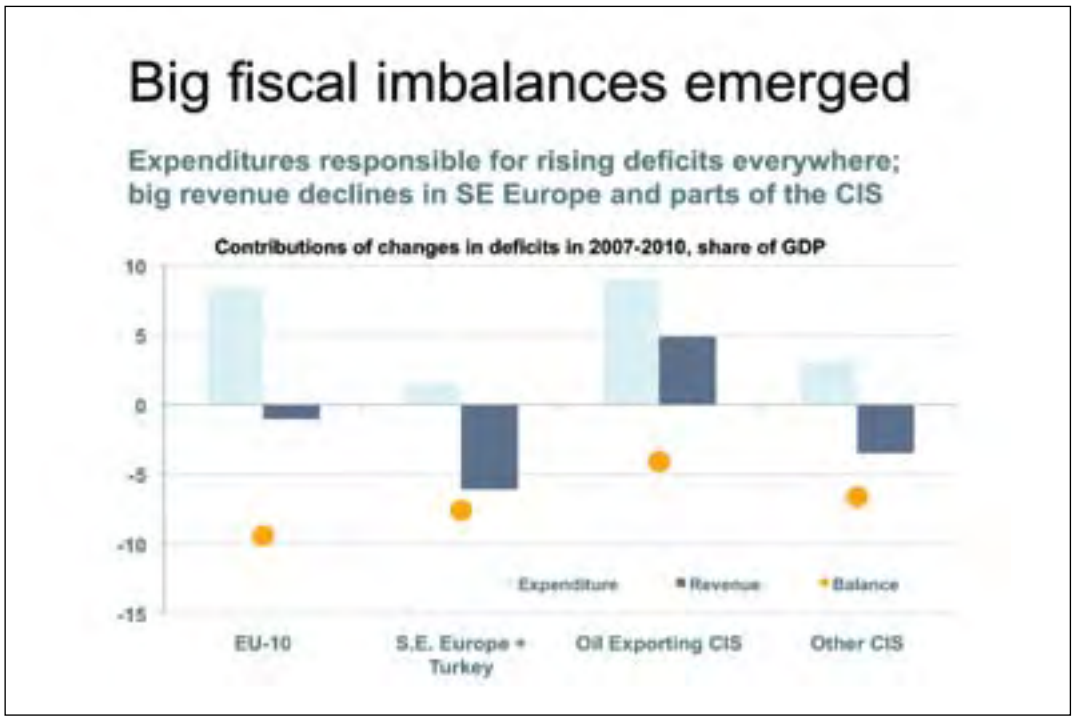


Source: World Bank, ECA Regional Tables.

During the Crisis

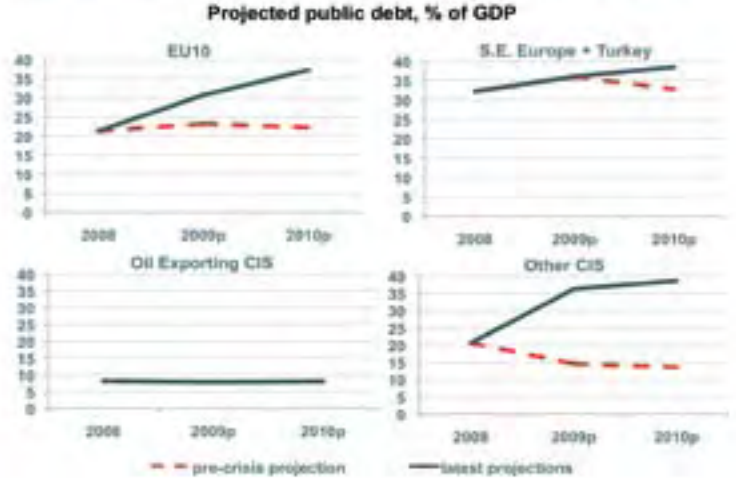
- Government revenues fell everywhere, but more in the east
- Public spending rose as a share of GDP, but stable in aggregate
- Fiscal balances deteriorated everywhere, but more in the east
- Oil and gas exporters implemented fiscal stimulus programs, but exit unclear


All relied on automatic stabilizers
Only ECA's oil exporters implemented discretionary fiscal stimulus programs
Contributions of changes in deficits, 2008-2009, % of GDP, median values
1
0
-1
-2
-3
-4
-5
-6
-7
EU-10
S.E. Europe + Turkey
Oil Exporting CIS
Other CIS
EU-15
EAP
LCR
Change in fiscal stance
Automatic stabilizers
Fiscal balance (change from 2008)


Big fiscal imbalances emerged
Expenditures responsible for rising deficits everywhere; big revenue declines in SE Europe and parts of the CIS
Contributions of changes in deficits in 2007-2010, share of GDP
10
5
0
-5
-10
-15
Expenditure
Revenue
Balance
EU-10
S.E. Europe + Turkey
Oil Exporting CIS
Other CIS

And public debt has grown

Public debt in Central and Southern Europe, and the non-oil rich CIS will be close to 40 percent in 2010

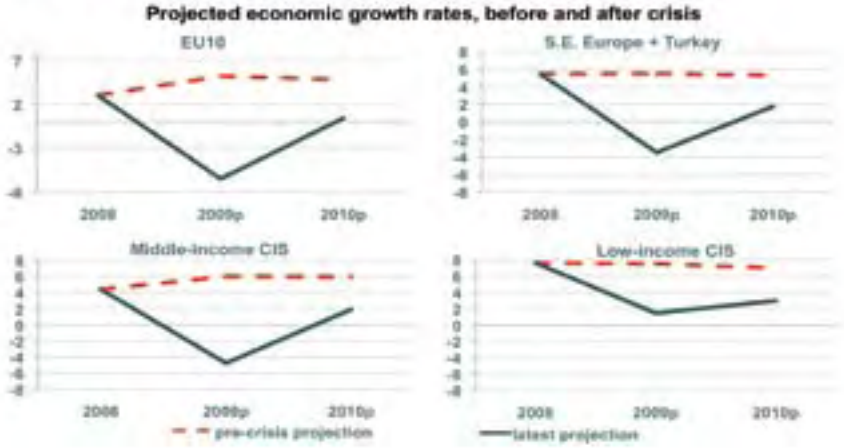


After the crisis

- Growth projected not to recover to pre-crisis levels
- Fiscal stimulus programs will not deliver growth
- Pressures to increase spending
- Projected divergence in spending and revenue trends within the region

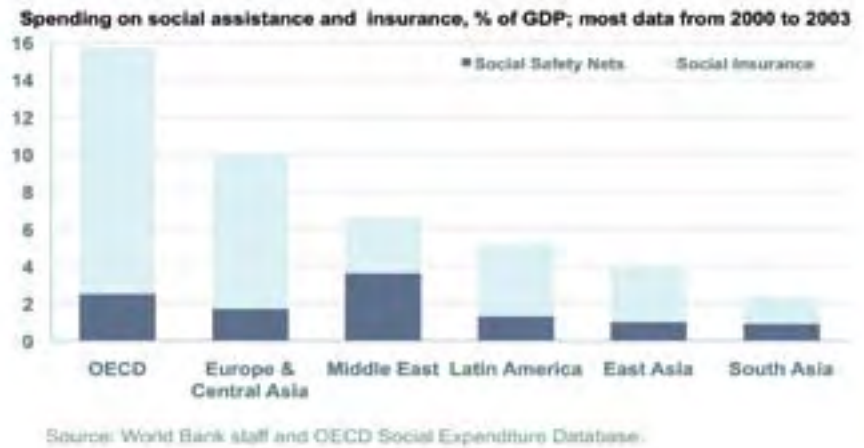
Lower growth post-crisis

GDP growth in 2010 will be about 5 percentage points lower than what was expected before the crisis



More pressure to reform pensions

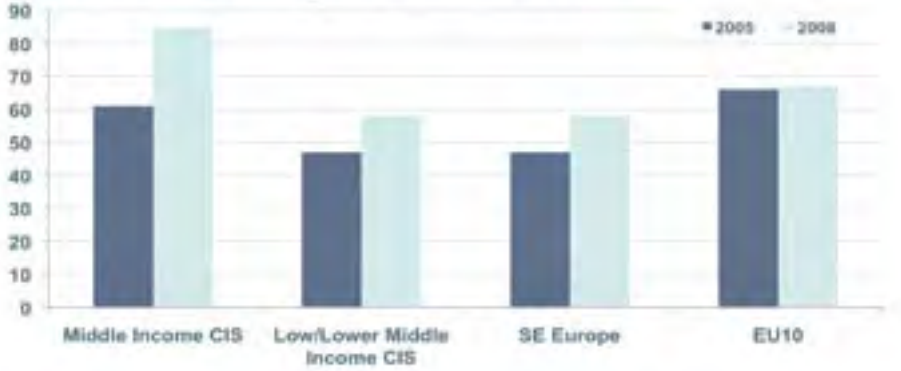
ECA's spending on social security resembles that in wealthier countries



Source: World Bank staff and OECD Social Expenditure Database.

More pressure to invest in education

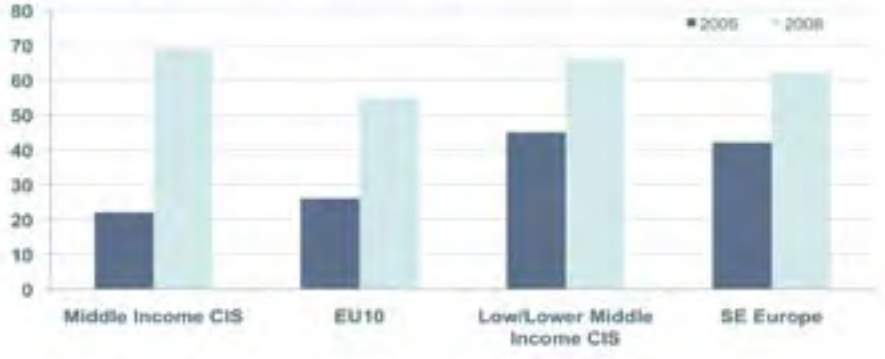
More enterprises are complaining that the skills of workers are becoming an obstacle for business



Source: BEEPS 2005 & 2008; percentage of firms indicating that skills and education of available workers is some form of constraint on business.

More pressure to invest in infrastructure

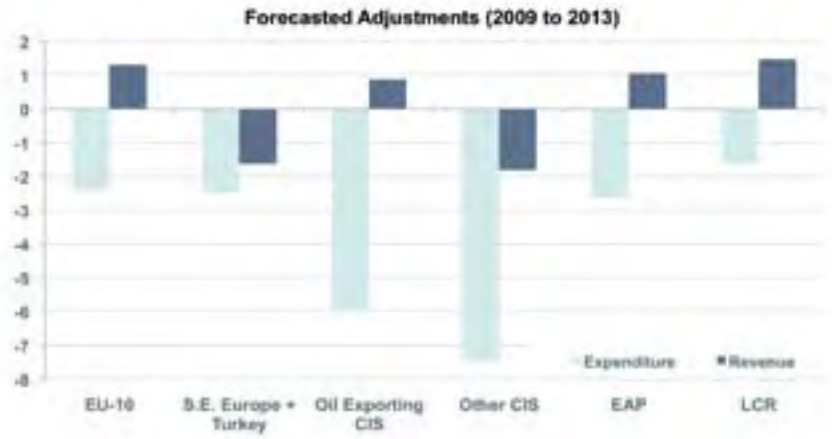
More enterprises are complaining that electricity is becoming an obstacle for doing business



Source: BEEPS 2005 & 2008; percentage of firms indicating that Electricity is some form of constraint to business

Divergence in region will grow

EU-10 adjustments will resemble those in middle income countries in East Asia and Latin America



Fiscal consolidation

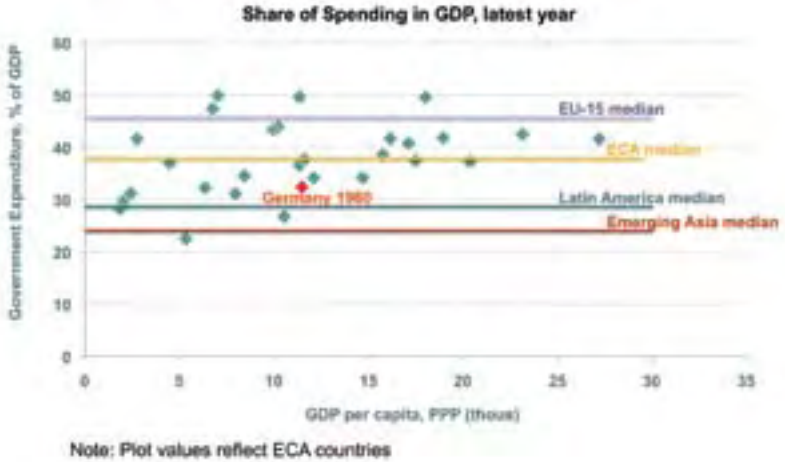
- Requires a closer look by country
- Requires making social sector reform a priority in many countries
- Requires reducing energy subsidies in much of the former Soviet Union
- Requires exit strategies from fiscal stimulus in oil and gas exporting countries

Post-crisis pressures

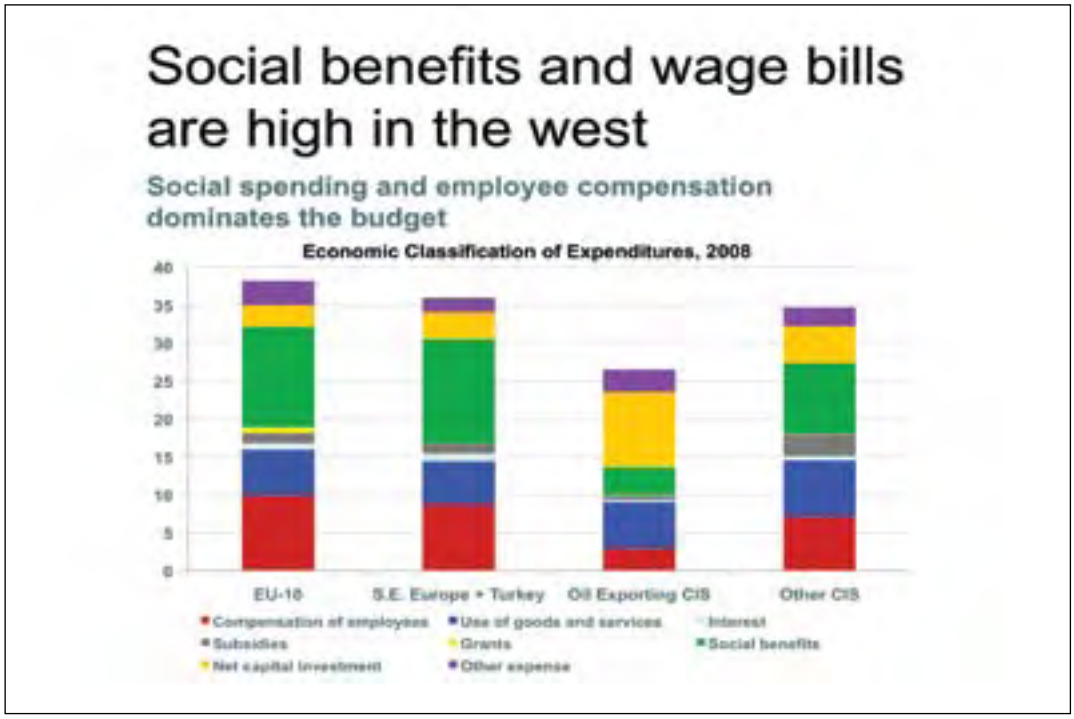
- **Slower growth** likely for most economies
  - ECA may not go back to pre-crisis growth rates soon
- Many governments will be **fiscally weaker**
  - Public debt levels will be higher after the crisis, and tax revenues possibly structurally diminished
- More pressure to address **climate change**
  - Pressure on emerging Europe to mitigate, on Eurasian countries to adapt

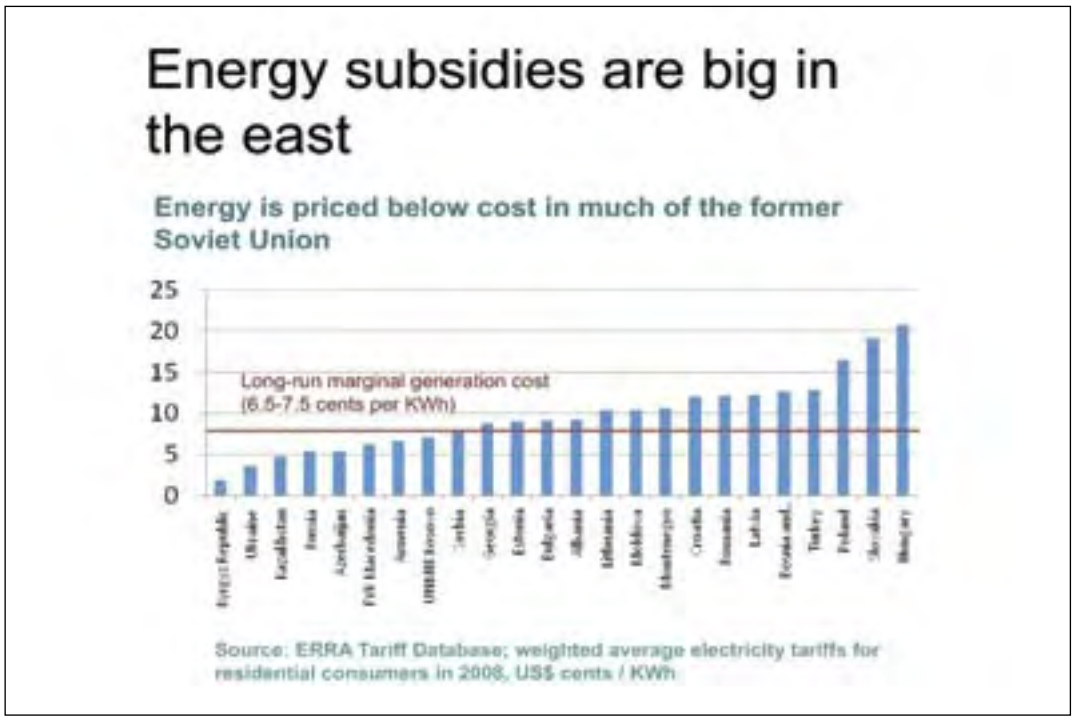
Governments in ECA are bigger

Government spending is greater than in Latin America and Emerging Asia today (and Germany in 1960)



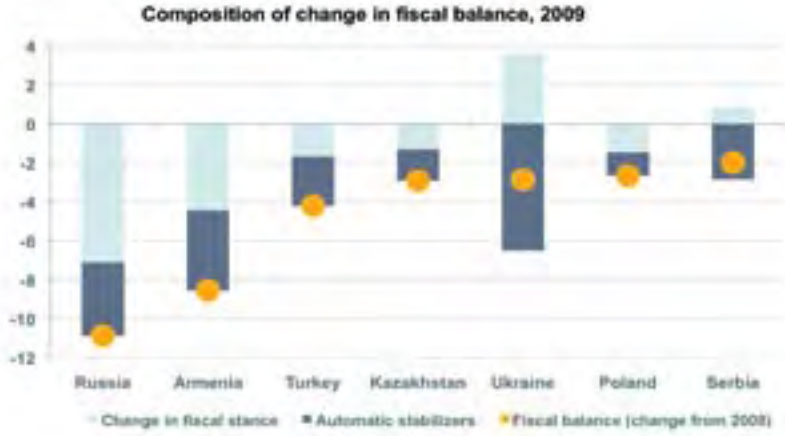
Note: Plot values reflect ECA countries


Social benefits and wage bills are high in the west
Social spending and employee compensation dominates the budget
Economic Classification of Expenditures, 2008
40
35
30
25
20
15
10
5
0
EU-10
S.E. Europe + Turkey
Oil Exporting CIS
Other CIS
Compensation of employees
Use of goods and services
Interest
Subsidies
Grants
Social benefits
Net capital investment
Other expense


Energy subsidies are big in the east
Energy is priced below cost in much of the former Soviet Union
25
20
15
10
5
0
Long-run marginal generation cost
(6.5-7.5 cents per KWh)
Source: ERRA Tariff Database; weighted average electricity tariffs for residential consumers in 2008, US$ cents / KWh

Seven cases

Automatic stabilizers and discretionary spending helped during 2009, except in Ukraine and Serbia

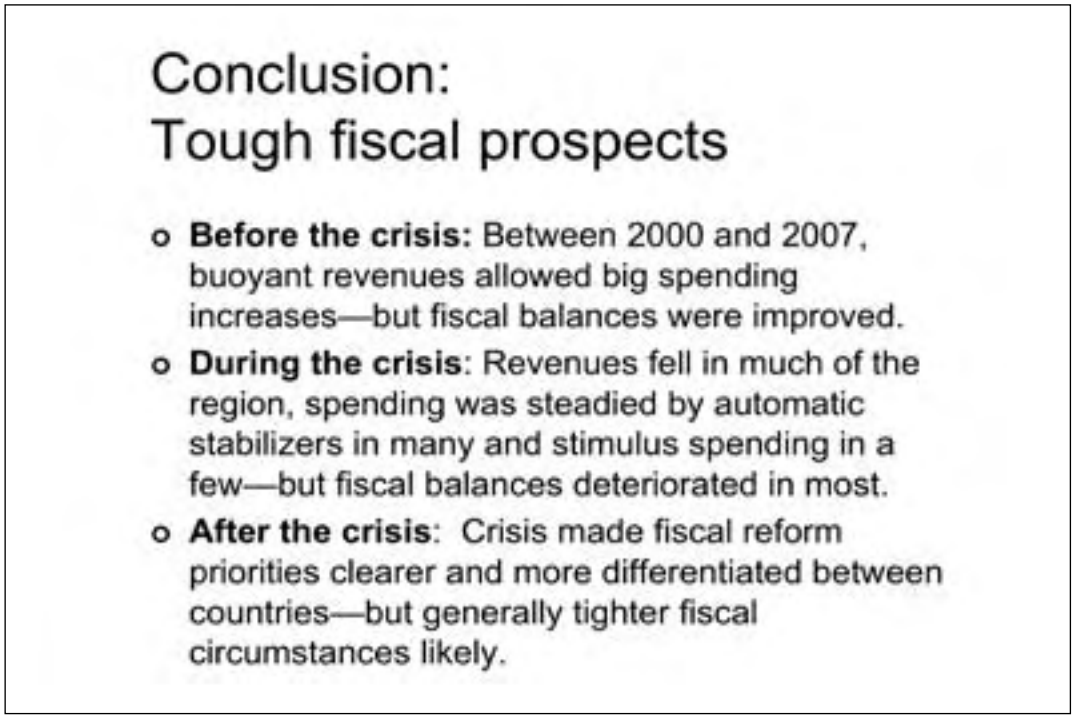


Priorities differ by country

Social security and education needs reform in many, combined with idiosyncratic mix of priorities

	Social Sectors			Productive Sectors			Other	
	Pensions	Education	Health	Energy Subsidies	Producer Subsidies	Infrastructure	Fiscal Stimulus	Revenue Mobilization
Poland	X	X	X			X		
Serbia	X	X			X			
Turkey	X		X					X
Ukraine	X			X				X
Russia				X			X	X
Kazakhstan		X				X	X	
Armenia		X				X		X

Source: World Bank Public Expenditure reviews and Development Policy Loan documents; see annexed case study summaries.


Conclusion:
Tough fiscal prospects
Before the crisis: Between 2000 and 2007, buoyant revenues allowed big spending increases—but fiscal balances were improved.
During the crisis: Revenues fell in much of the region, spending was steadied by automatic stabilizers in many and stimulus spending in a few—but fiscal balances deteriorated in most.
After the crisis: Crisis made fiscal reform priorities clearer and more differentiated between countries—but generally tighter fiscal circumstances likely.

Enterprise Financial Crisis Assessment Survey: Impact of Global Economic Crisis on Cor-porate Sector in ECA

Paulo Guilherme Correa, Lead Economist, ECSPF, World Bank
pcorrea@worldbank.org

Paulo Guilherme Correa introduced the results of the Enterprise Financial Crisis Assessment Survey (second wave, from January to March 2010).
According to the survey's main findings, firstly, most companies maintained their current level of R&D expenditures in 2009 (including the world largest R&D spenders). However, expenditures decreased for example in Lithuania, Romania and Bulgaria; countries that had shown very low R&D intensity already before the crisis. Secondly, public support to R&D decreased in the ECA region, which is a sharp contrast to the OECD region. Thirdly, the growth rate of innovative and export-oriented companies was positive.

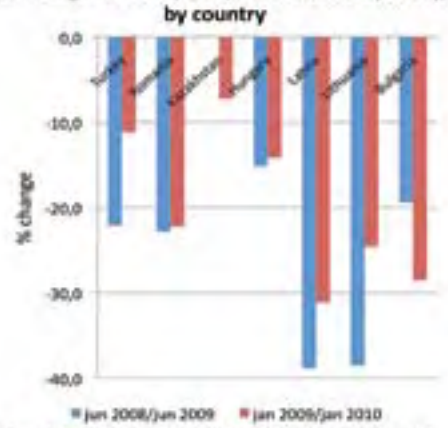
After the crisis, R&D will be important for GDP and export growth. Developed countries have already included measures to foster R&D and innovations in their "stimulus packages". Existing innovation policies should be reformed to raise their impact on firms' productivity. This can be achieved by rebalancing priorities of public R&D expenditures (public vs. private sector, basic vs. applied research), by cutting costs of public research organizations, by promoting the commercialization of R&D (aligning the IPR regime of public private research etc.), and by improving governance regimes.

Four Key Messages

1. Despite the crisis, most companies in the ECA region managed to keep or expand R&D expenditures
2. Due to serious fiscal constraints, public support to R&D and innovation was sometimes reduced in the ECA region (a sharp contrast to OECD countries)
3. Yet innovation and R&D will be important sources of GDP and export growth in the post-crisis period
4. In this context, renewed efforts to increase the impact of innovation policies on competitiveness (more "bang for the buck") will be needed from policymakers

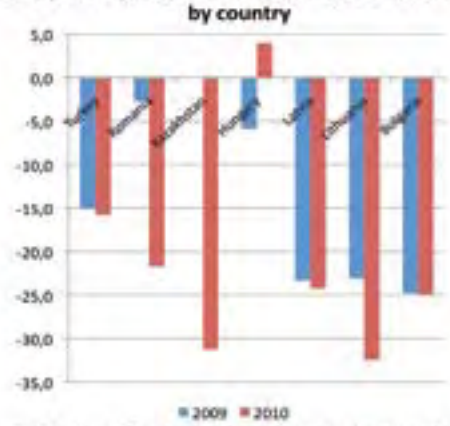
The global financial crisis hit hard companies in ECA

Net change in sales (2009/2008 and 2010/2009), by country



Sales drop reduced in the last 6 months (except in Bulgaria)

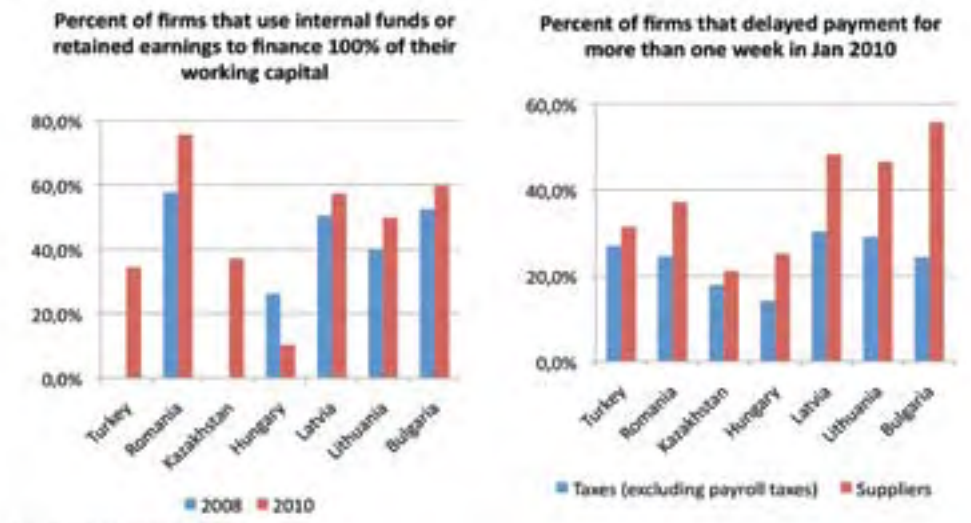
Change in capacity utilization (compared to 2007), by country



Yet utilization of installed capacity continued to decrease

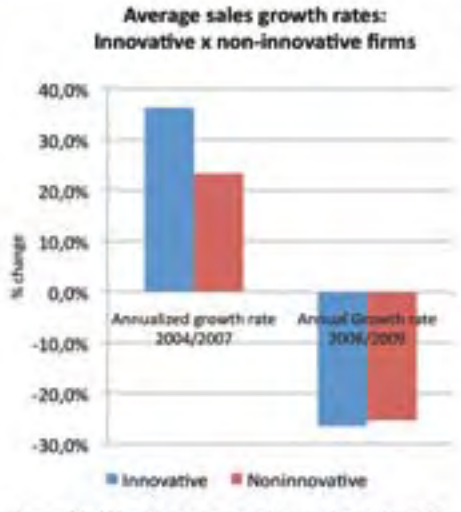
Source: World Bank ECA 2010

Firms responded by increasing the use of internal funds to finance working capital and delaying payments



Source: World Bank EFCS 2010

Sales decline was large for innovative firms



Source: World Bank Policy Research Working Paper No. 5278

- The sales growth rate of innovative companies has decreased around 16 percentage points more than the sales growth rate of non-innovative over time, at 5% level of significance.

Results correspond to panel data estimators, controlling for firm characteristics (age, skill of workforce, size, export orientation, country and sector.

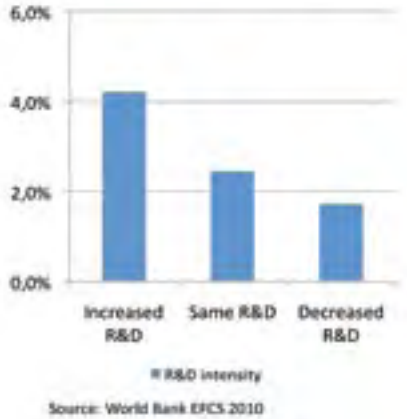
Why?

- When comparing innovative firms that are export-oriented with innovative firms that are domestically oriented, we found that:
  - the sales' growth rate of innovative and export-oriented companies was positive while the sales' growth rate of innovative and domestic oriented companies has been negative
- Tentative interpretations:
  - Innovative and export-oriented firms were able to better diversify market- risk (and thus were less affected by demand fluctuations in one single country)
  - Innovative and export-oriented firms supply goods with higher "intrinsic value" (and thus have higher monopoly power despite operating in an international market)

Most of the innovative firms managed to keep or expand their R&D investments in 2009

- Within firms who performed R&D activities before the crisis, only 27.8% (about 39,000 firms in the 7 surveyed countries) have decreased their R&D spending in 2009
  - This proportion is (significantly) higher...
    - In Romania (45.3%), Lithuania (45.2%) and Bulgaria (32.3%)
    - for non-foreign owned firms (28.8%)
    - for small firms (30.8%)
  - Decreasing R&D firms used to have the lowest R&D intensity before the crisis

Average R&D intensity and R&D share in the country (before the crisis), by R&D change in 2009



Source: World Bank EFCS 2010

The performance of the group of world largest R&D spenders is similar

- According to a Booz-Allen survey of 1,000 public corporations worldwide that spent the most on researching and developing products and services approximately 2/3 kept or increased their R&D spending.
  - R&D spending for the top 20 companies was up 3.2 percent for 2008, less than half the 10.7 percent increase for the previous year
  - Toyota (-5.7%), GM (-1.2%), Ford (-2.7%) and Honda (-4.2%) concentrated the bulk of the decline, reflecting the crisis in the automobile industry.
  - Pharmaceutical; Electronic and software sector did not show any dominant pattern – with Astra Zeneca (16.4%); Samsung (16.2%) and Microsoft (14.6%) presenting the largest increases.

Developed nations have included measures to foster R&D and innovation in their "stimulus packages"

- Three-quarters of OECD countries took additional measures to foster innovation after the crisis
- Countries were split evenly between those that increased R&D tax credits and those that provided additional direct grants for business R&D
- Some did both (e.g. France, Japan, Norway, and the U.S.)
- A much smaller number of countries also increased direct funding for public R&D
- The **American Recovery and Reinvestment Act** will provide USD 652 billion from 2009 to 2011 (USD 787 billion in support from Feb. 2009 2019)

Source: OECD (2010): Economic Policy Reforms – Going for Growth

Incentives to R&D and innovation were sometimes reduced in ECA countries

- **Latvia** is cutting R&D budget for project-based funding (from €10.4m in 2008 to €6.0m in 2010)
- In **Romania**, according to the 2007-2013 National RDI Plan, the money assigned to R&D was €139m, that is below the amount provided in the 2008 budget
- Fiscal constraints in most **Central European** countries did not allow for the adoption of fiscal stimulus packages and often imposed dramatic expenditure cuts
  - For example, Latvia, Lithuania and Romania will need to undergo fiscal adjustments of at least 7% of GDP (primary balance)

Yet innovation and R&D will be important sources of GDP and export growth in the post-crisis period

- The region's pre-crisis growth path – often based on aggregate demand and growing current account deficits – needs eventually to be replace by one based on productivity gains and innovation
- Natural resource exporting countries suffered steep downturns in economic activity highlighting the importance of export diversification (and in that context innovation)
- The OECD estimates that that increasing R&D by 0.1% points could raise GDP by about 1.2% in the long-run
- Reaching the Lisbon Agenda R&D target (3% of GDP) is expected to raise GDP up to 13% and exports up to 16%.

The effects of Lisbon Agenda R&D target in 2025: simulations on the WorldScan Model

	GDP	Exports
Croatia	6.0	12.9
Poland	5.5	8.5
Romania	11.7	13.5
Hungary	6.4	8.0
Slovakia	8.9	10.4
Slovenia	6.9	10.5
Bulgaria	13.1	8.3

The numbers are cumulative changes that result achieving 3% target as compared to the baseline in 2025

Source: Lejour A., Verweij G. and ter Weel B. (2008)"The Economic Effects of the Lisbon Targets: the case of Croatia". Background Paper for the Report N.o 48879 "Croatia's EU Convergence Report: Reaching and Sustaining Higher Rates of Economic Growth".

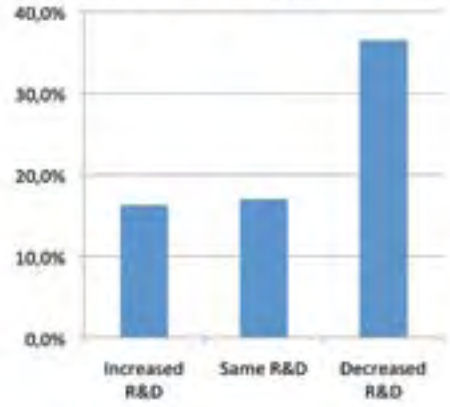
Reforming existing innovation policies to raise their impact on firms' innovation and productivity

Innovation Policy for Competitiveness:
Preparing for the Upturn

- Rebalancing country priorities on public R&D expenditures, especially in terms of public vs. business sector (also basic vs. applied research)
- Adopting cost saving measures in public research organization (encouraging PRO to reach out the market)
- Preserving public support to private R&D (possibly increasing tax breaks and raising matching-grants available to SMEs)
- Promoting the commercialization of public research (aligning the IPR regime of public financed research; supporting technology transfer offices; providing early stage financing and strengthening policies to nurture start-ups)
- Improving the governance regime: coordination; participation of the business sector and evaluation of existing programs

R&D decline seems linked to firm liquidity and age

Average share of short term liabilities in 2010, by R&D change in 2009



Source: World Bank EFCS 2010

- Decreasing R&D firms in 2009 have higher share of short term liabilities
- When performing an ordered probit model – controlling for size, age, export orientation, country and sector - the results show that:
  - the probability of having decreased R&D spending in 2009 increases (significantly) for overdue firms and young firms (<5 years old)

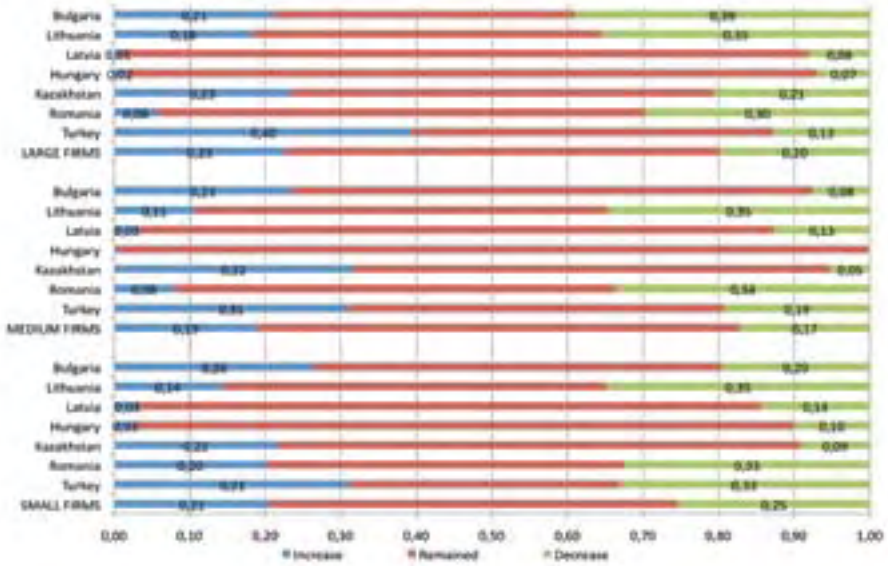
The crisis effect on innovation differs by firm size

- Across all firm sizes, more than half of firms kept their current level of R&D expenditures.
- Of those that changed, 25% of Small Firms decreased R&D expenditures. Comparatively, 17.2% of medium sized firms spent less in R&D, as well as 19.9% of large firms.
  - The highest proportion of Small Firms (less than 20 employees) with R&D decreases is found in Turkey (33.3%), Romania (32.5%) and Lithuania (34.9%)
- However, in specific countries, Medium and Large Firms are relatively more affected :

a) The proportion of medium sized firms (20-99 employees) that decreased R&D expenditures is specially higher in Romania (33.6%) and Lithuania (34.7%)

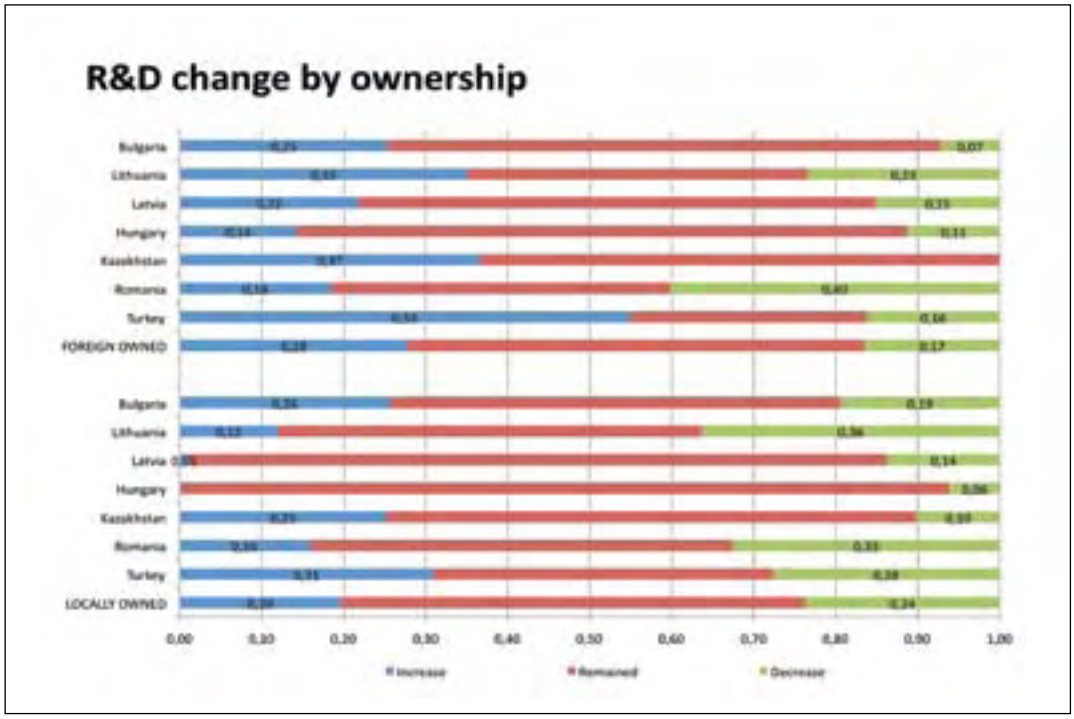
b) As well, a relatively high proportion of large firms (>100 employees) decreased R&D expenditures in Bulgaria (39%), Lithuania (35.5%) and Romania (29.7%)

R&D change by firm size



Innovation efforts of foreign firms are less affected by the crisis when compared to locally owned

- 27.8% of foreign owned firms increased R&D expenditures compared to 19% of locally owned.
- Contrastingly, 23.4 % of locally owned firms decreased R&D compared to 16.6% of foreign owned.
  - Many foreign firms in Turkey are using the downturn to prepare better for the rebound, 54% are increasing R&D expenditures.
  - On the contrary, 40% of foreign firms in Romania are cutting R&D expenditures.


R&D change by ownership
Bulgaria
Lithuania
Latvia
Hungary
Kazakhstan
Romania
Turkey
FOREIGN OWNED
Bulgaria
Lithuania
Latvia
Hungary
Kazakhstan
Romania
Turkey
LOCALLY OWNED
0,00
0,10
0,20
0,30
0,40
0,50
0,60
0,70
0,80
0,90
1,00
Increase
Remained
Decrease

A View from Russia

Ksenia Yudaeva, Director, Center for Macroeconomic Research, SBERBANK, Russia
KVYudaeva@sberbank.ru

Ksenia Yudaeva portrayed the innovation strategies of Russia. At the beginning of the economic crisis, Russia experienced a sharp outflow of capital. R&D activity in companies as well as training programs decreased significantly. In addition, governmental financial support for start-ups fell. Only 25% of Russian firms estimated their technological level to be comparable with foreign companies.

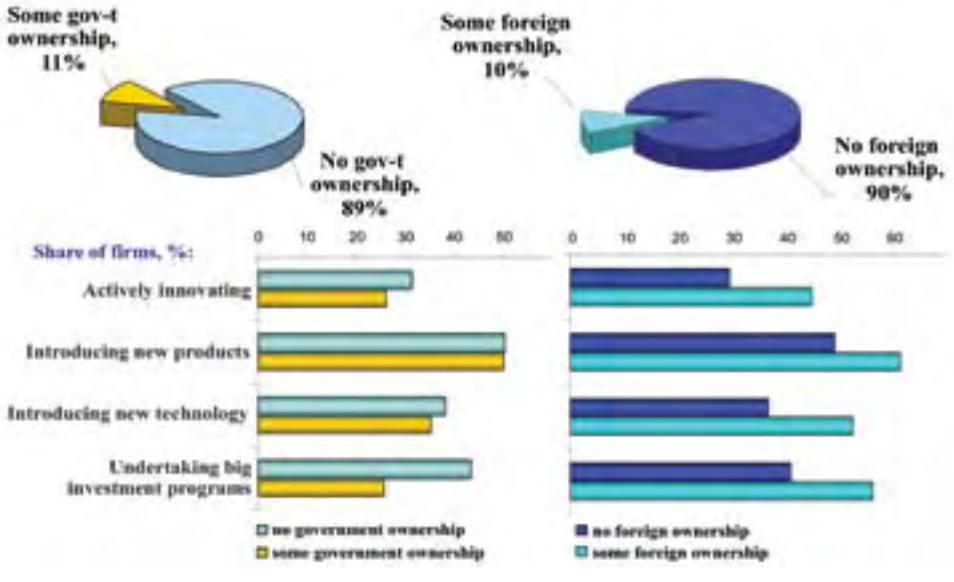
Russia needs a diversification strategy, competitive sectors and innovation-driven growth. For-eign companies give major boost for innovation. Drawbacks for the economic development are low levels of entrepreneurship, the lack of management skills, an insufficient use of IPR, an unfriendly business climate, and the incomplete recovery of the banking system.

Has crisis affected innovations in Russia? – The short answer is "NO": If something does not exists, nothing can affect it.

Pre-crisis situation according to the HSE 2009 enterprise survey:

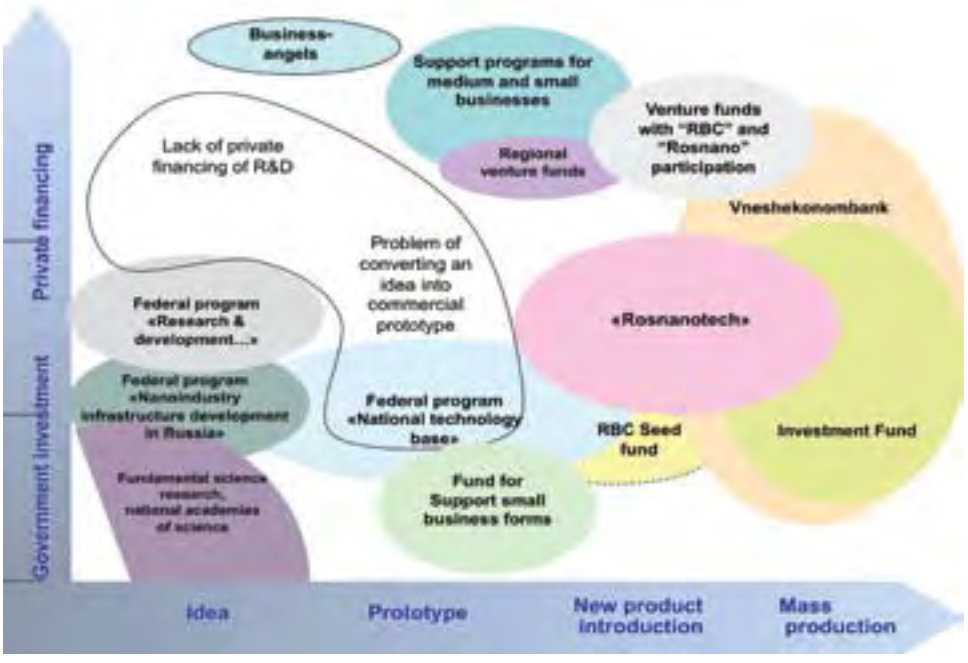
- Only 25% of firms self estimate their technological level as equivalent to the level of their foreign competitors.
- Share of firms, doing R&D, decreased from 37% in 2004 to 29% in 2008. However, R&D spendings, conditioning on doing R&D, increased. .
- Share of firms, having training programs for employees decreased from 69% in 2004 to 50% in 2008. Only in 25% of firms training programs cover more than 10% of personnel.

Presence of foreign companies remains the major factor of innovations



What about startups?

- Prior to the crisis a number of "development institutions" was established by the government to support innovations:
  - **Rusnano** (support of business and infrastructure development in nanotechnologies). Government support initially was equal to 130 bn rubles ($4.4 bn), but in 2009 it was cut in half until 2011. At the moment Rusnano invested at about 38 projects; total investments in the projects equal to 96 bn. Rubles, Rusnano investments 51,8 bn.Rubles
  - **Russian venture company** (support of venture funds and infrostructure building). Initial government support 30 bn.Rubles. At the moment 7 venture funds were supported with overall capital of 19 bn.Rubles. As of November 2009 only 18% of capital was invested.
  - **Small business in sience and technology support fund.** Total budget in 2009-2010 is 4.8 bn. Rubles. Normally finances 800 projects per year. Results by now:
    - More than 2000 innovation companies
    - More than 15 000. job
    - **3 000 young researchers supported by the government**
  - **Technology commercialization SEZ.** Currently 4 SEZ exists:162 projects with overall costs of 121.5 bn. Roubles.
- Effect of the crisis: financing was reduced, but it has never been and has not became a binding factor.



I. Development and lessons from the crisis: timing and transmission channels

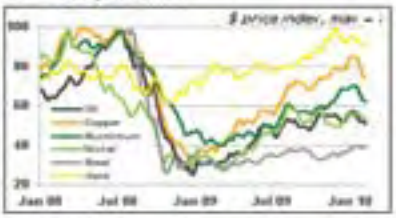
2007 - Aug 2008	Sept 2008 - Mar 2009	April 2009 – …
• High oil prices • Credit boom • Lack of proper risk management • Insufficient prudential regulation • High volatility • High level of mistrust	• High capital outflow • Financial crisis • Credit crunch • Devaluation • NPL crisis in banking sector	• Green shoots and stabilization of the world economy • Commodity prices bounced back • => Stabilization in Russia • CBR got opportunity to cut interest rates

Crisis transmitted to the Russian economy through the following channels: 1) sharp capital outflow 2) collapse of commodity prices 3) "sudden stop" in world credit markets. (see the next slide)

Because of distrust into national currency CBR was unable to provide loose monetary policy from the very beginning. Only in Q2 2009 it began to cut interest rate. **Future economic situation largely depends on developments in the world economy.**

I. Development and lessons of crisis: main indicators

Commodity markets



Stock markets

Foreign currency exchange

Capital inflows

I. Development and lessons of crisis: lessons

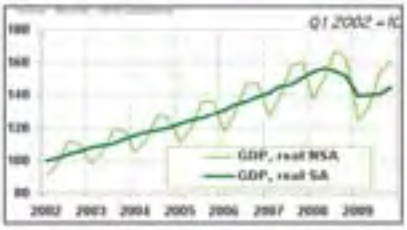
Russia was among the countries most severely hit by the crisis

Lessons Russia has to learn

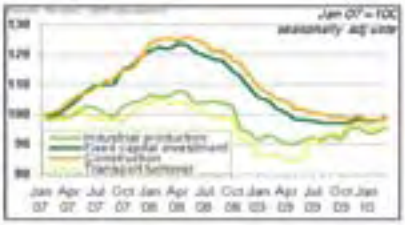
Macroeconomic policy	Banking sector regulation
In 1999-2008 Russian policy aimed at sustaining growth through ER management, but it missed to stabilize inflation expectations. Massive capital outflows at the beginning of the crisis provoked run from the national currency. As a result Government and Central Bank were unable to weaken policy to the extend sufficient for support of the economy.	Due to lack of restructuring banking sector remained weak and segmented before the crisis. In addition Russia experienced classic credit boom. As crisis unfolded this resulted in high NPL level and poor banks' balances. To avoid future crises reforms in financial sector are necessary, including prudential regulation in accordance with G20 recommendations, and banking sector consolidation.

REAL ECONOMY: Recovery started, but not stable yet

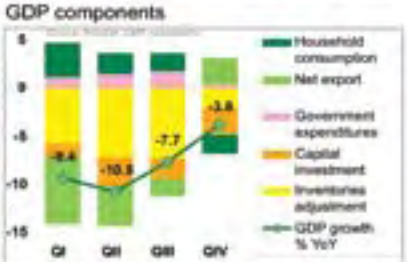
GDP



Industry

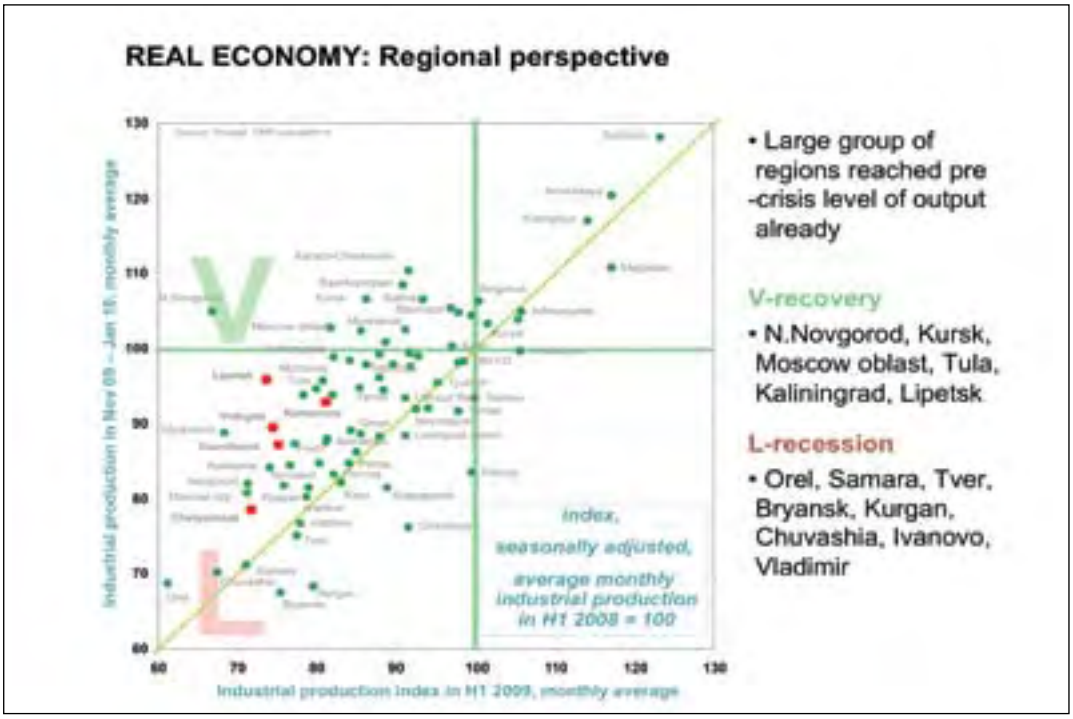


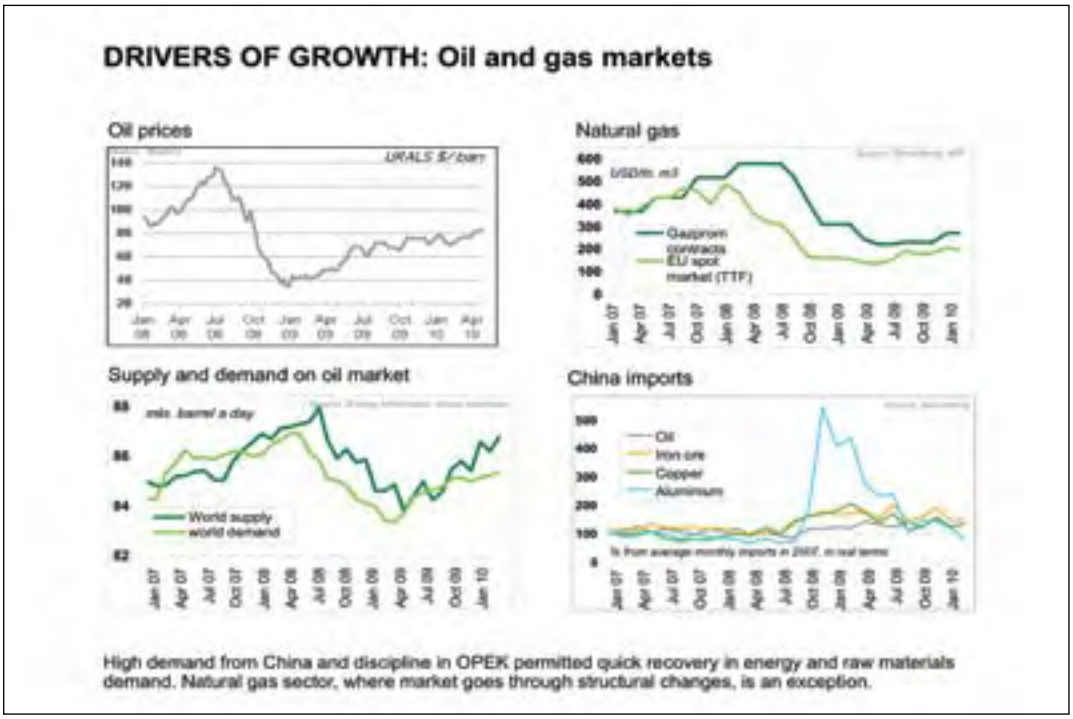
GDP components



Indices

3rd and 4th quarters of 2009 see increasing positive input into GDP from export and inventories cycle.


REAL ECONOMY: Regional perspective
Industrial production in Nov 09 – Jan 10, monthly average
Industrial production index in H1 2009, monthly average
index,
seasonally adjusted,
average monthly
industrial production
in H1 2008 = 100
• Large group of regions reached pre -crisis level of output already
V-recovery
• N.Novgorod, Kursk, Moscow oblast, Tula, Kaliningrad, Lipetsk
L-recession
• Orel, Samara, Tver, Bryansk, Kurgan, Chuvashia, Ivanovo, Vladimir

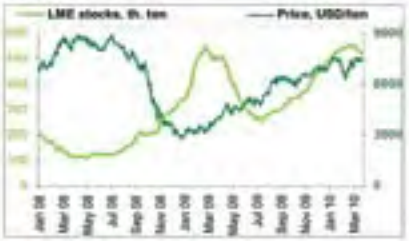

DRIVERS OF GROWTH: Oil and gas markets
Oil prices
URALS $/barr
Natural gas
USD/th. m3
Gazprom contracts
EU spot market (TTF)
Supply and demand on oil market
mln. barrel a day
World supply
world demand
China imports
Oil
Iron ore
Copper
Aluminium
High demand from China and discipline in OPEK permitted quick recovery in energy and raw materials demand. Natural gas sector, where market goes through structural changes, is an exception.

DRIVERS OF GROWTH: Metal markets

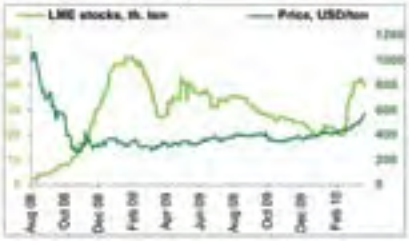
Aluminium

Nickel

Copper

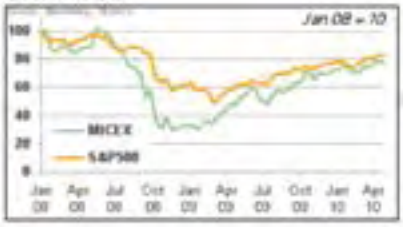


Steel (mediterranean)

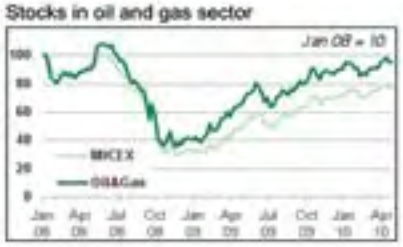


DRIVERS OF GROWTH: Stock markets

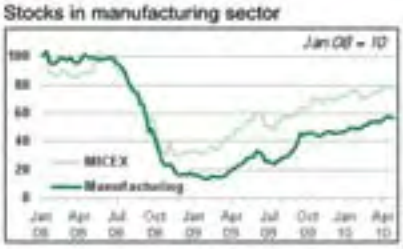
Stock indices



Stocks in oil and gas sector



Stocks in manufacturing sector

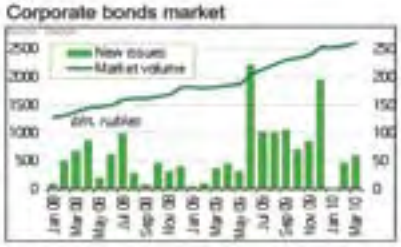


Stocks in financial sector

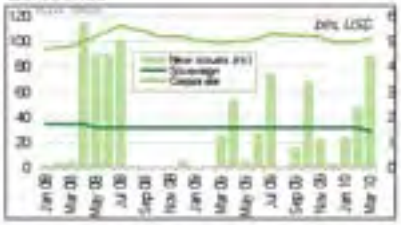
Excess liquidity on global financial markets leads to a rally on world and Russian stock markets. Energy out-, while manufacturing under-performs.

DRIVERS OF GROWTH: Bond markets

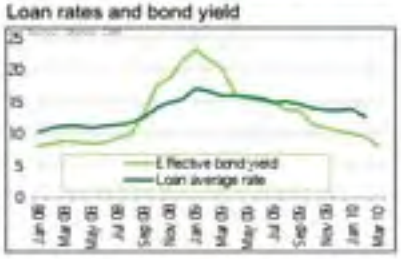
Corporate bonds market



Eurobonds



Loan rates and bond yield



Russian companies' IPO in 2009-10

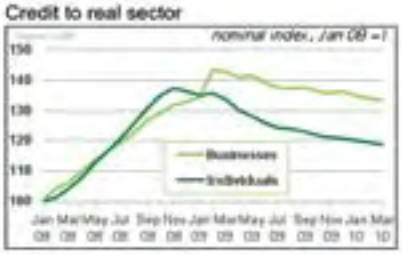
- Not a single IPO in 2009
- SPO in 2009 attracted $1,15 bln.
- VTB equity offering bought out by the gov-t
- Jan 2010: RUSAL IPO gets $2,2 bln.
- Many IPO are planned for 2010

(SUEK, Protek, MetalloInvest, Russkoe more, Rusagro, Kuzbass fuel company, EMAlians, Uralchem)

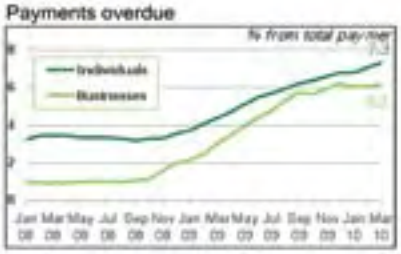
Corporate bond market boom and IPO perspectives enhance financial situation for large Russian companies. Medium and small businesses are in a more difficult situation

CHALLENGES AND RISKS: Financial sector

Credit to real sector

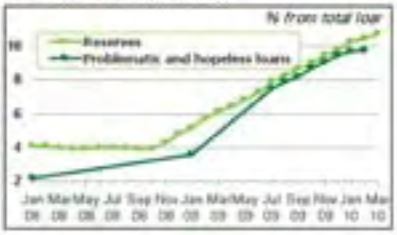


Payments overdue



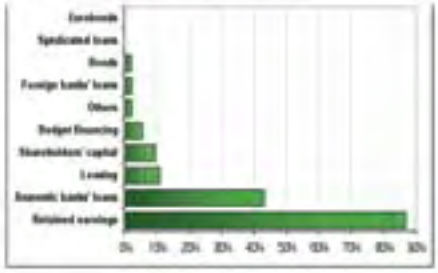
Credit and deposit rates

Reserves and bad loans

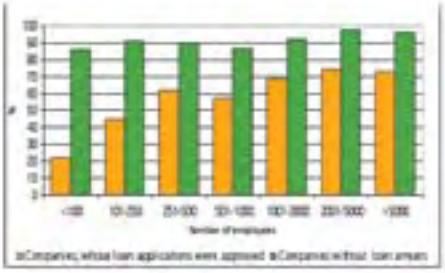


Survey data: credit availability and usage or credit

Sources of companies' financing



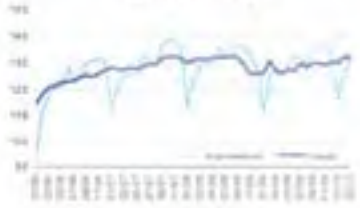
Companies' size, loan rejections and arrears



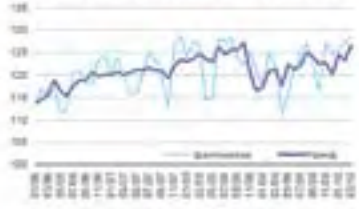
- According to HSE survey: prior to crises competitive firms financed most of their investments from retained earnings. Leverage was larger in non-competitive firms.
- Sberbank survey: only 10 % apply for credit because of needs to finance investment projects
- Sberbank survey: because of crisis 63-93% of firma cut down their investment plans.

Effect of the crisis on different industries:

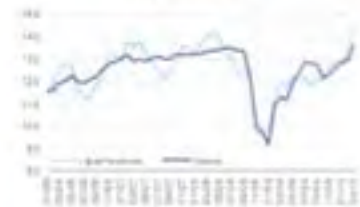
Food industry



Oil, coal and nuclear products



Chemicals



Machinery & equipment

Source: Center for Macroeconomic analysis and Short-Term forecasting

Some lessons from the crisis:

- Natural resource dependence was positive factor which speeded up initial stage of recovery.
- Noncompetitiveness of cyclical sectors slows recovery down.

Crisis have shown that technological modernization is important not only for long-term development but also for more balanced growth.

Current policies in innovation sphere

- Rusnano and RVC are getting more active in creating innovations ecosystem
- Techno park in Skolkovo
- President committee on modernization of economy
- The fact that budget switched from 6% surplus o 6.5% deficit has not affected government desire to create innovation-driven economy

Limiting factors:

- entrepreneurships and management skills
- IPR and general business climate

Plenary II: Diversification Strategies

Building on the analysis of the previous section, the second plenary session proceeded to examine possible sources of future growth by addressing the potential benefits of economic diversification. Dr. Hausmann and Dr. Maloney both discussed theories of diversification as an instrument to promote growth, debated their merits and application to the regional context of ECA, and shared experiences of other developing and developed countries that have pursued similar strategies. Following this debate, ministers of selected ECA countries (Serbia and Armenia) presented their experience and the challenges they are facing in advancing respective policies, including insights to specific projects that each country is promoting in the field of innovation.

Diversification: Why and How?

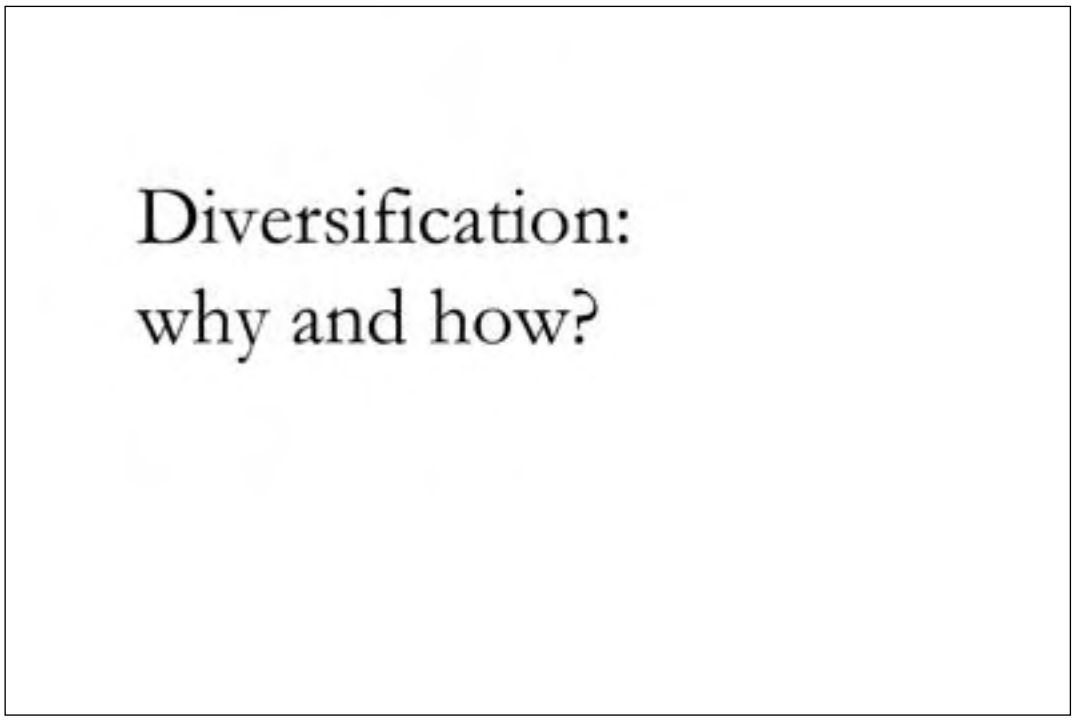
Ricardo Hausmann, Director of the Center for International Development, Harvard University
ricardo_hausmann@harvard.edu

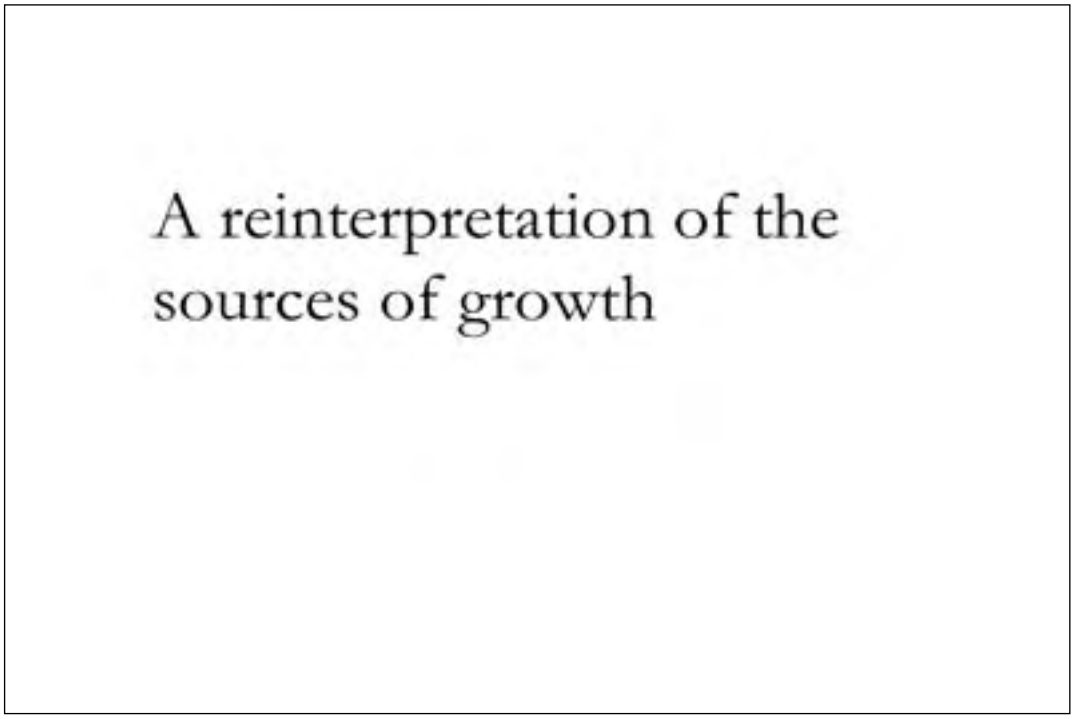
Ricardo Hausmann explained the importance of (product) diversification for economic growth.

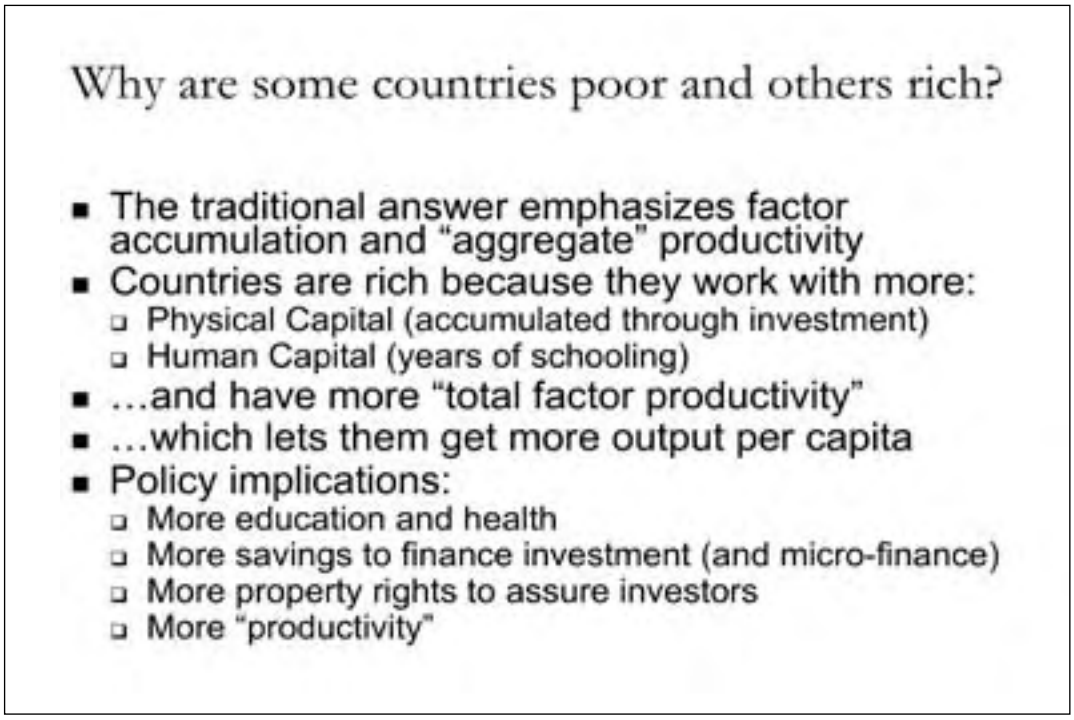
Generally speaking, rich countries are able to produce virtually everything – especially products which are complex and require different capabilities. By contrast, poor countries usually produce few, already established products which require only basic capabilities.

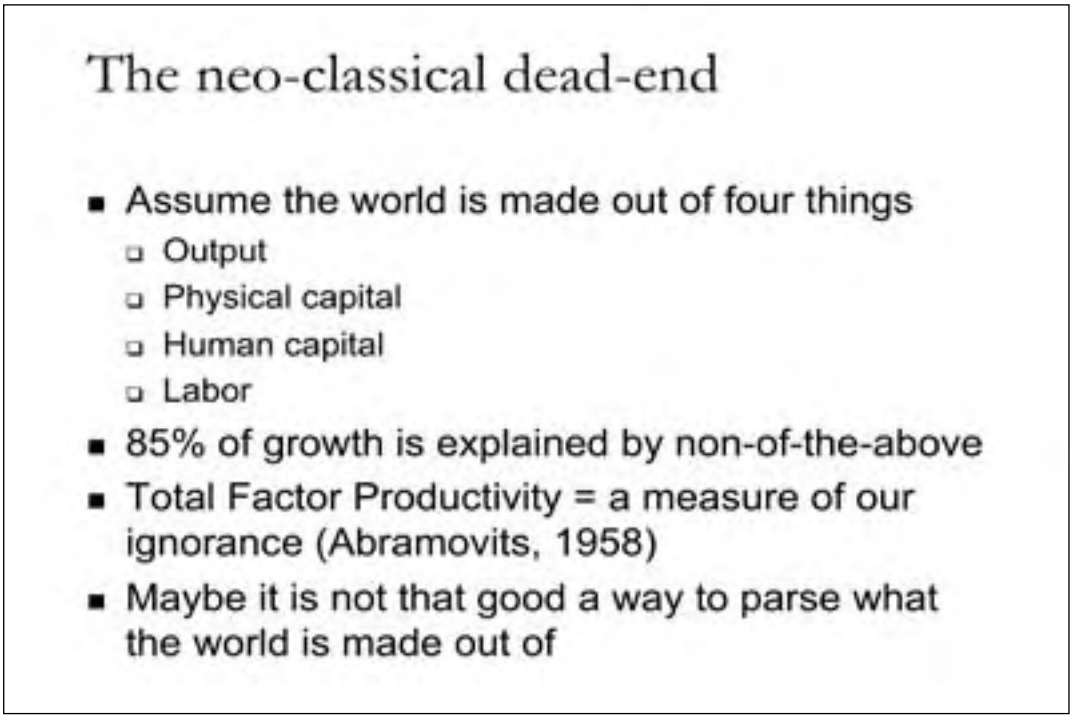
Complex products require a lot of very specialized skills which only rich countries can support (education, high salaries and very specialized companies). Poor countries, in turn, find it hard to develop these specialized capabilities. Nevertheless, without complex products, revenue streams are not sufficient to support education and to develop the needed capabilities. Without these skills/capabilities, again, there are no high paying products.

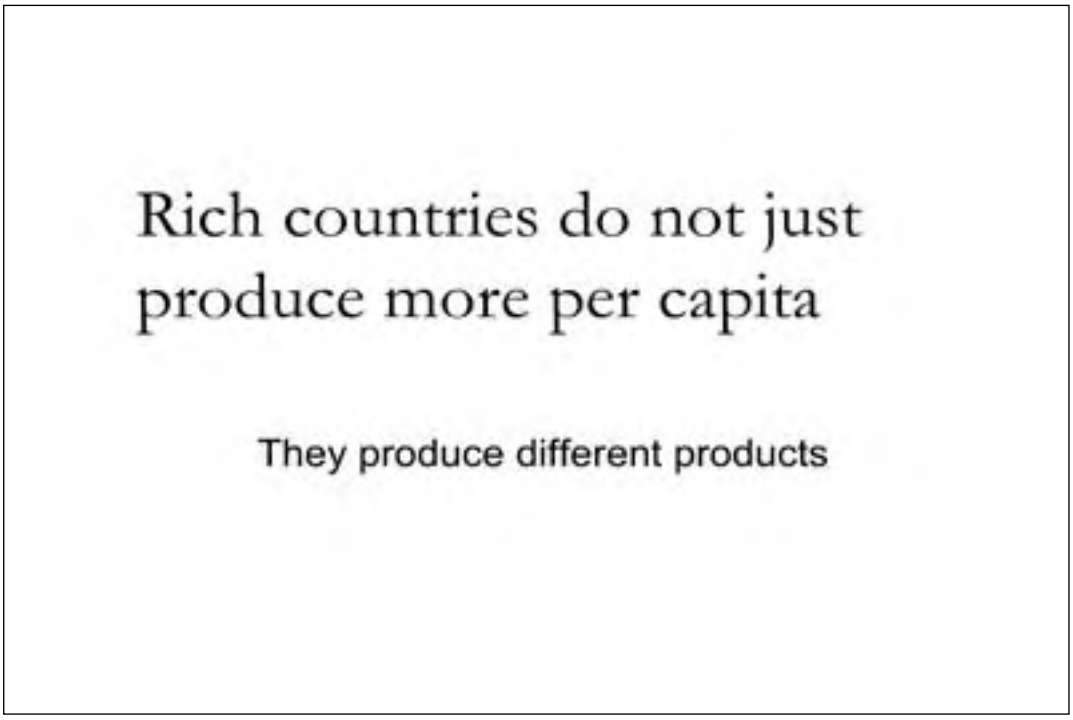
One solution to this dilemma is to find related products which require similar capabilities. Step by step diversification should expand existing capabilities and result in new export products. Conclusively, diversification leads to innovation which, ultimately, leads to economic growth.




A reinterpretation of the sources of growth


Why are some countries poor and others rich?
The traditional answer emphasizes factor accumulation and "aggregate" productivity
Countries are rich because they work with more:
Physical Capital (accumulated through investment)
Human Capital (years of schooling)
…and have more "total factor productivity"
…which lets them get more output per capita
Policy implications:
More education and health
More savings to finance investment (and micro-finance)
More property rights to assure investors
More "productivity"

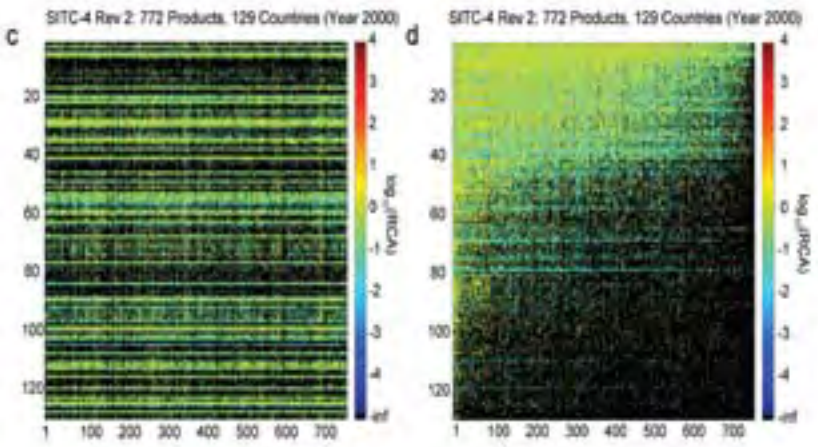

The neo-classical dead-end
Assume the world is made out of four things
Output
Physical capital
Human capital
Labor
85% of growth is explained by non-of-the-above
Total Factor Productivity = a measure of our ignorance (Abramovits, 1958)
Maybe it is not that good a way to parse what the world is made out of


Rich countries do not just produce more per capita
They produce different products

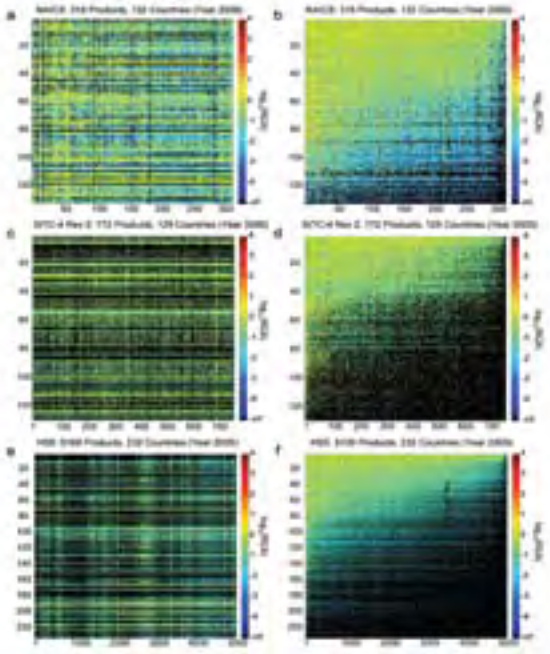
An alternative view

- Countries differ in the variety of the capabilities they have
- Rich countries make more kinds of products and more complex products that require many capabilities
- Poor countries make simple products that reflect the few capabilities they have

The hidden structure in the comparative advantage of nations



It does not matter what level of aggregation you use



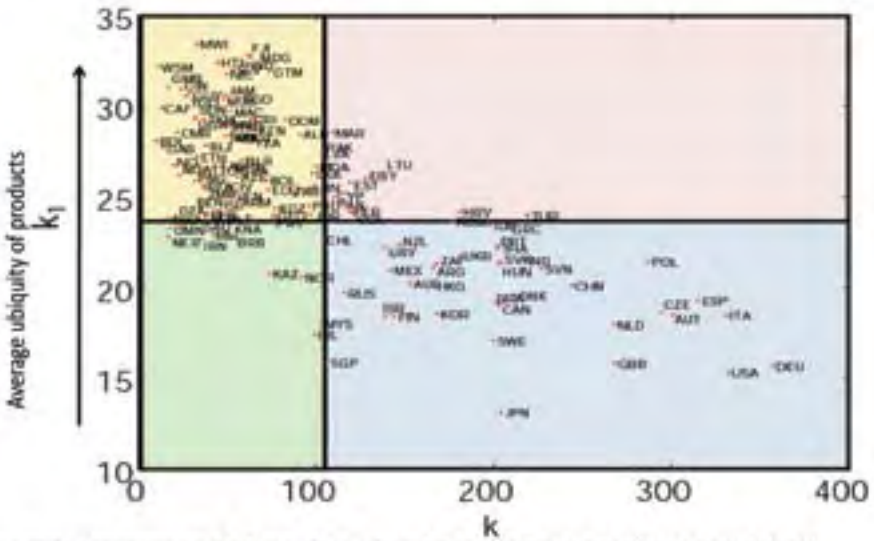
Intuition

- Countries have capabilities
- Products require capabilities
- Countries that have more capabilities will be able to make more products
  - They would be more diversified
- Products that require more capabilities will be made by fewer countries
  - Products will be less ubiquitous

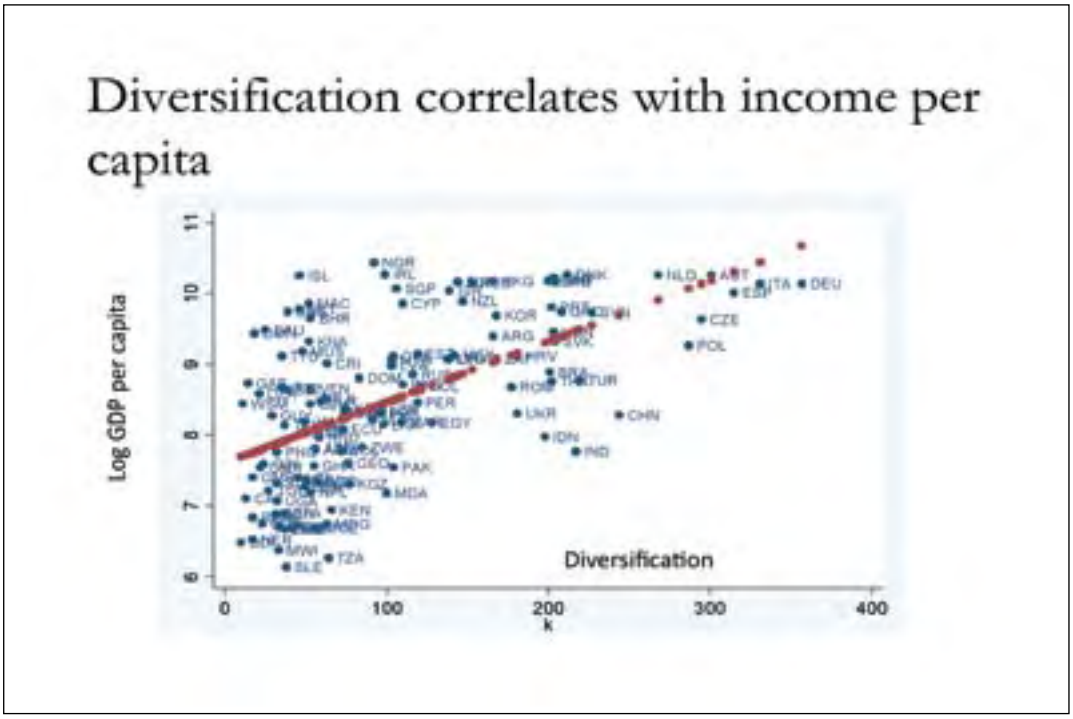
Intuition (cont'd)

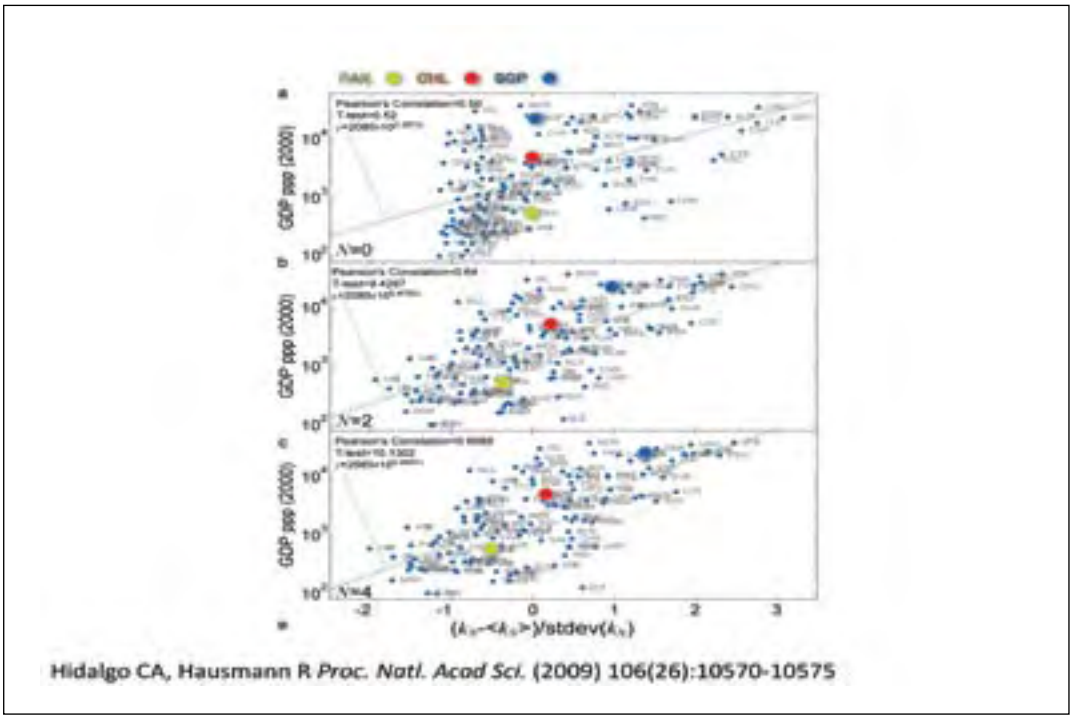
- Countries that have more capabilities will be able to make products that are less ubiquitous
- Hence, countries that have more capabilities will be more diversified but will make less ubiquitous products
- Diversification of countries and ubiquity of products are negatively correlated
  - They are indirect measures of the capability set of countries

Method of Reflections: k-k_1 diagram

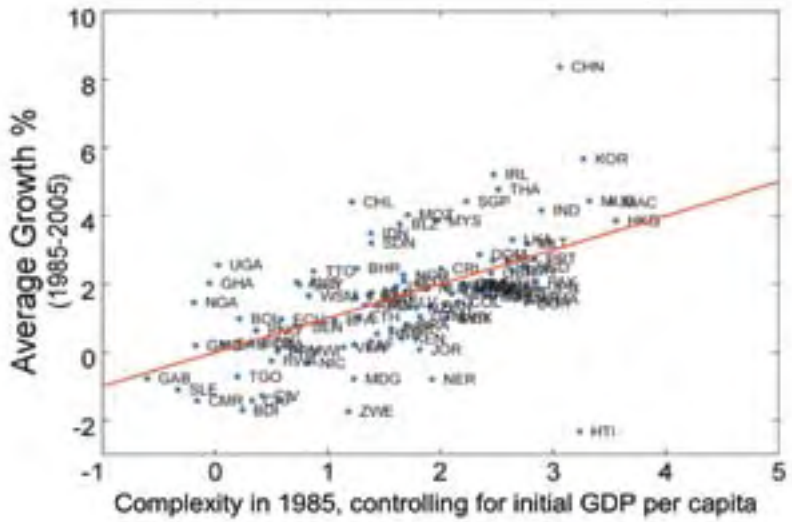


Hidalgo CA, Hausmann R *Proc. Natl. Acad Sci.* (2009) 106(26):10570-10575





Hidalgo CA, Hausmann R *Proc. Natl. Acad Sci.* (2009) 106(26):10570-10575



Hidalgo CA, Hausmann R *Proc. Natl. Acad Sci.* (2009) 106(26):10570-10575

What makes growth difficult?

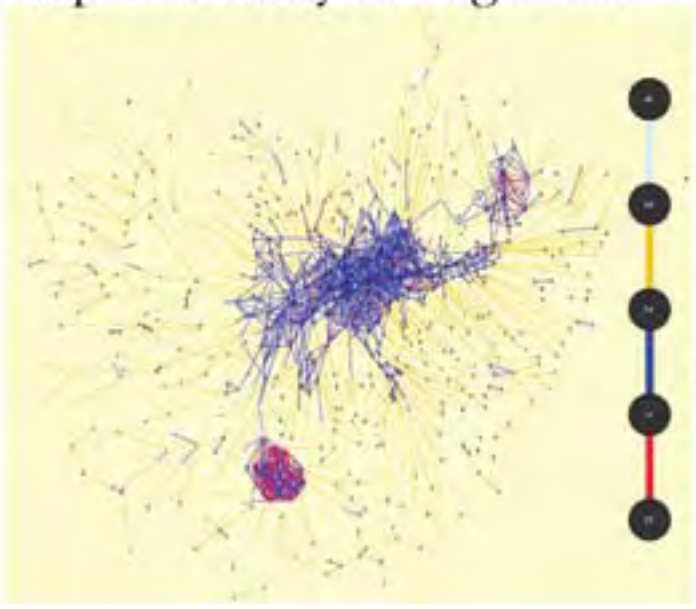
- The chicken and egg problem
- You cannot make new products because you lack the capabilities
- You don't want to accumulate the capabilities because the products that need them are not being made
  - Because of other missing capabilities
- How does the world deal with this?
- By moving towards "nearby" products

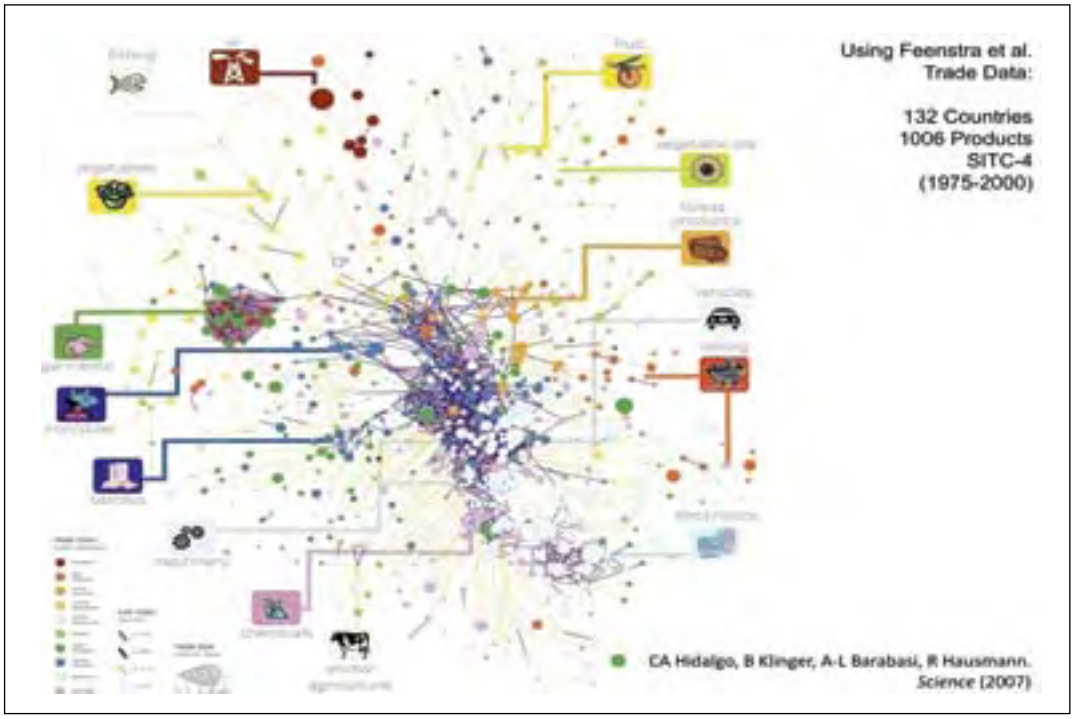
Step 1: Maximum Spanning Tree

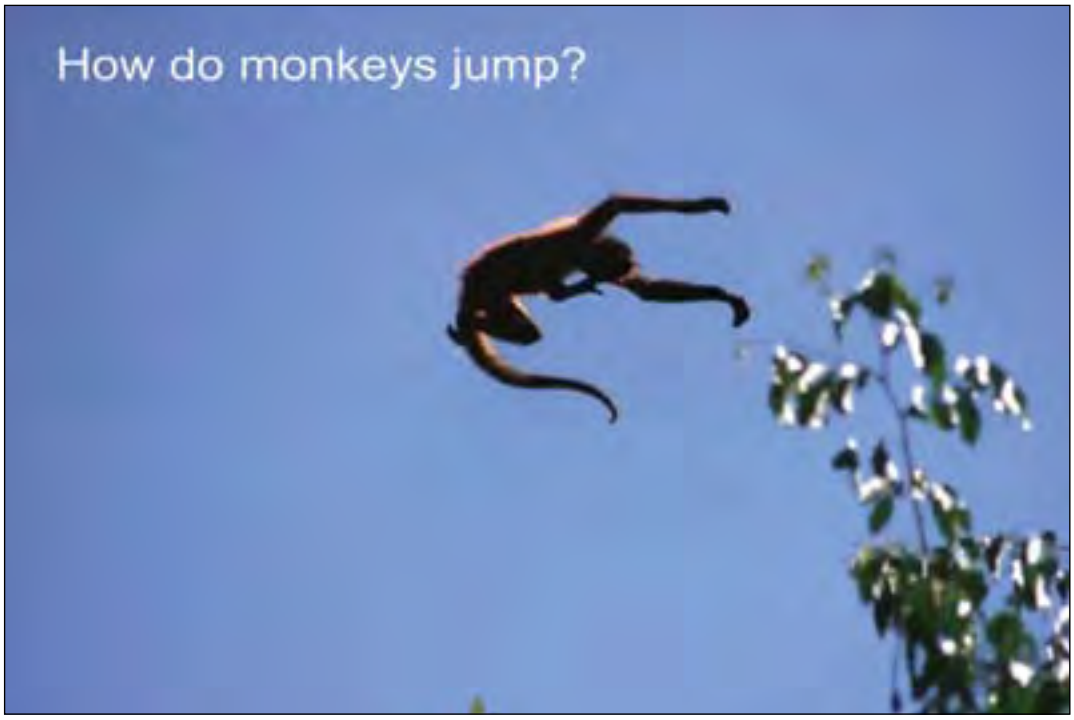
Our Approach:

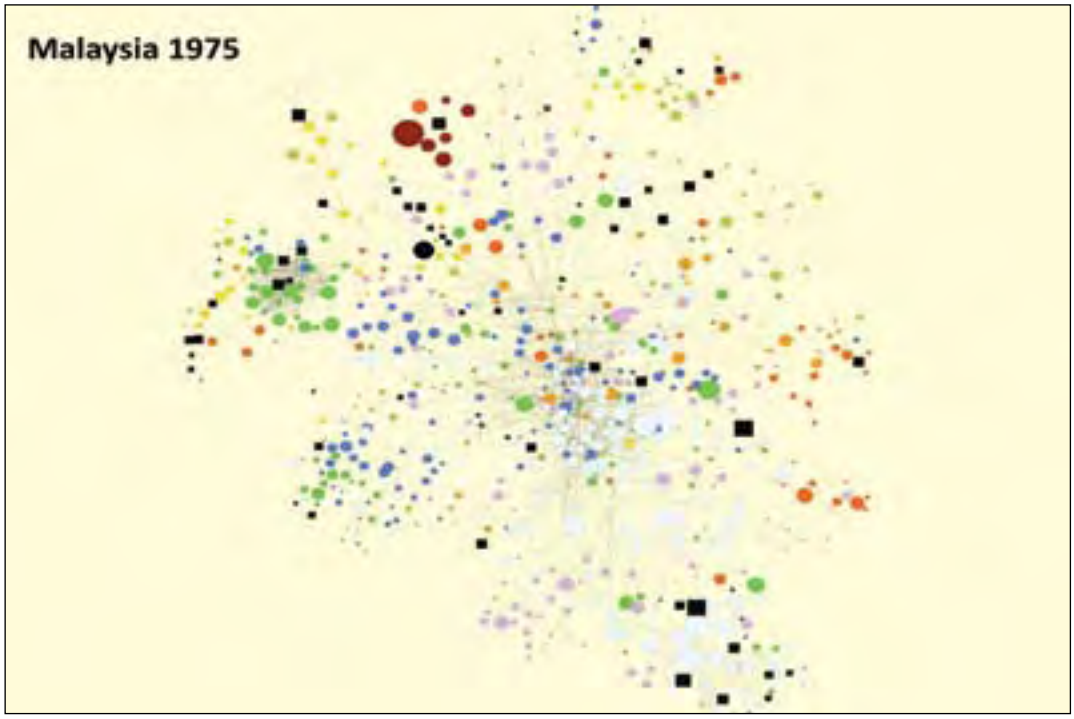
- Distance measured by probability that, if a country is good in one product, it's also good in another product.
- What is the shape of a forest?
  - Homogenous or Heterogeneous?
- What does it look like?

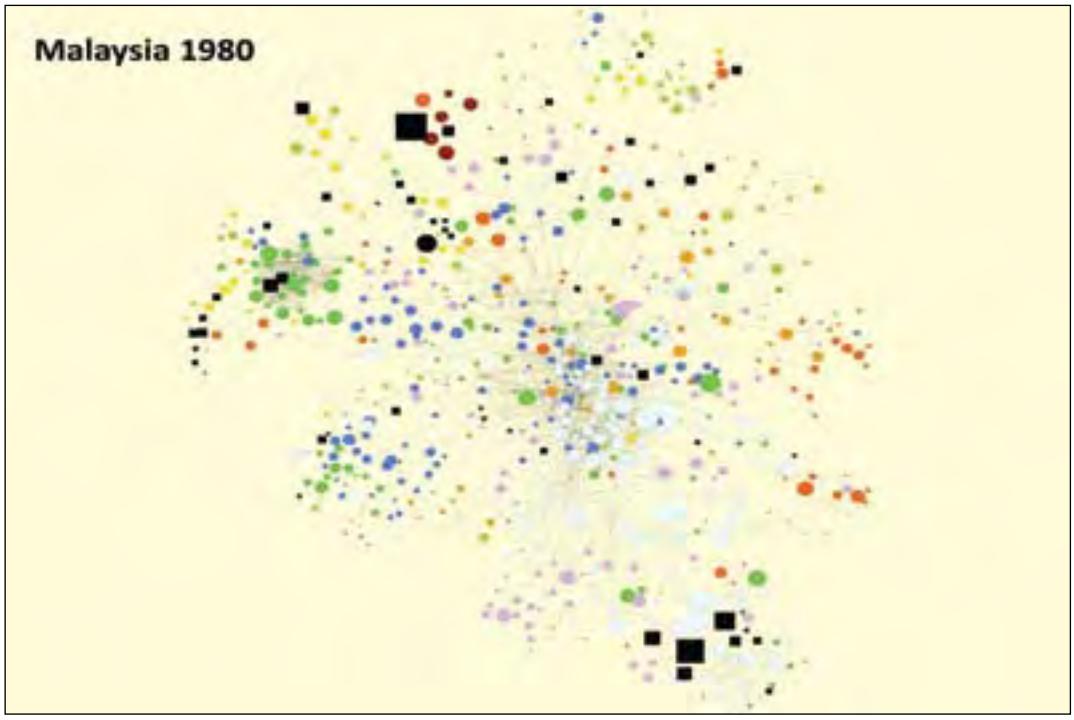
Step 2: Overlay Strong Links

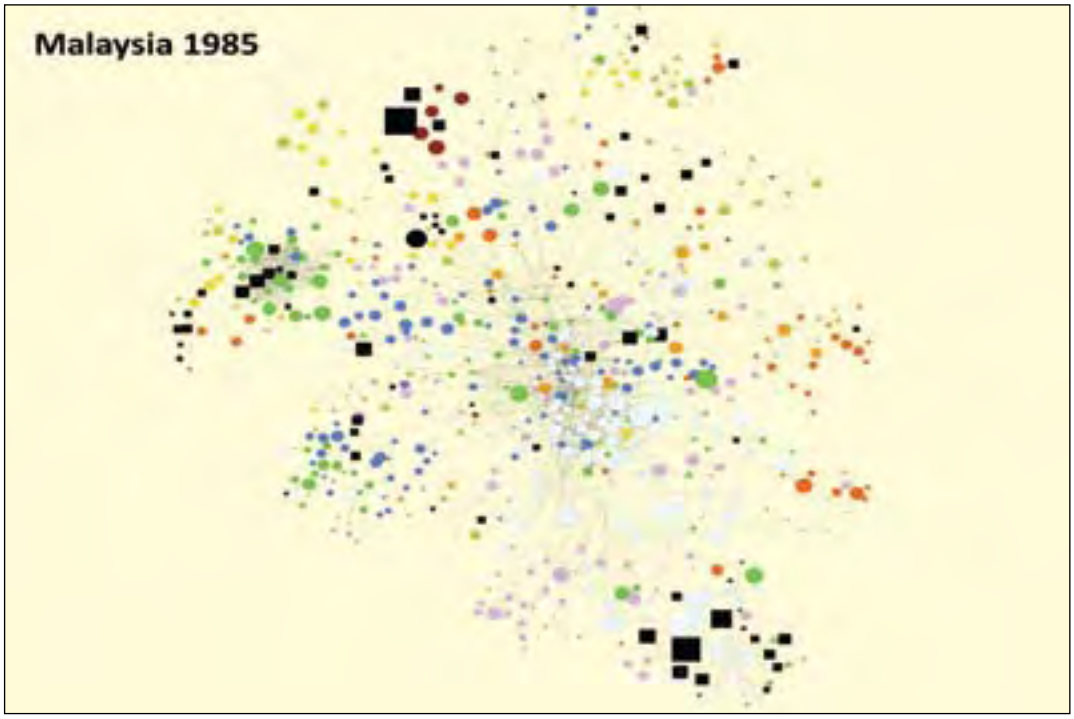


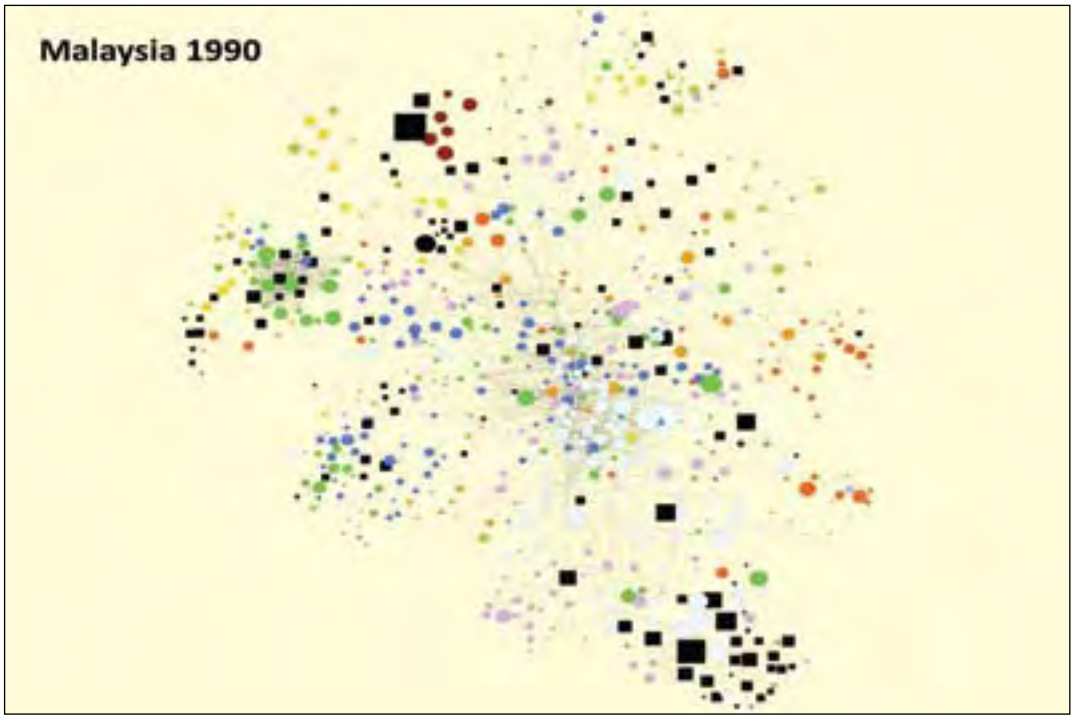

Using Feenstra et al.
Trade Data:
132 Countries
1006 Products
SITC-4
(1975-2000)
CA Hidalgo, B Klinger, A-L Barabasi, R Hausmann.
Science (2007)

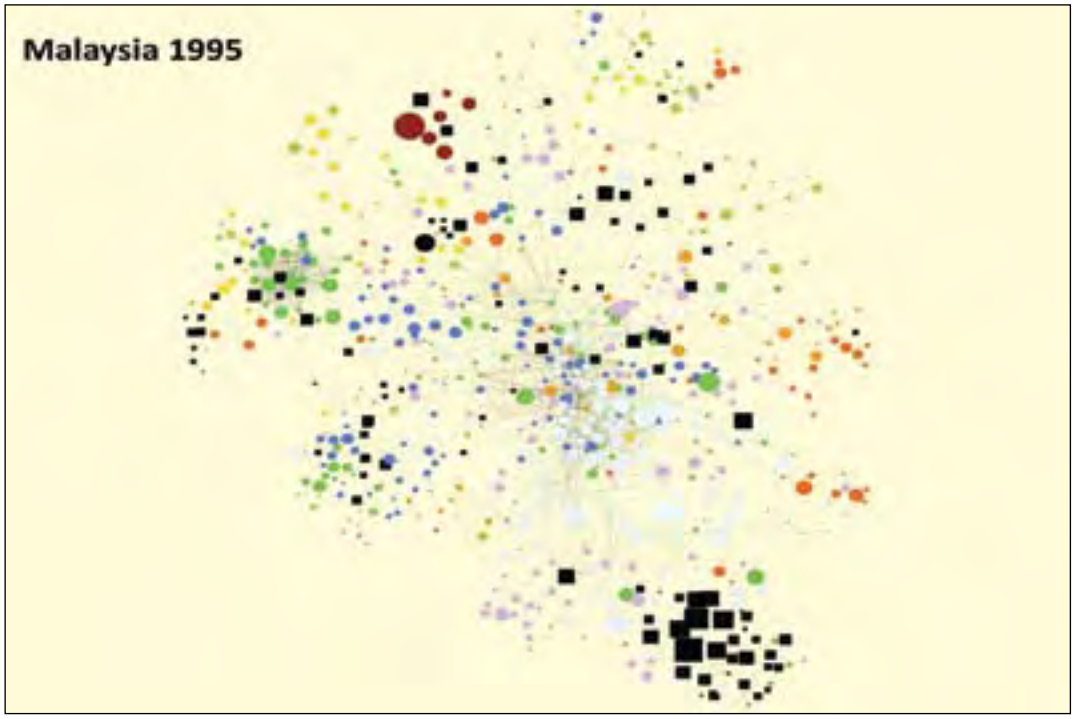

How do monkeys jump?

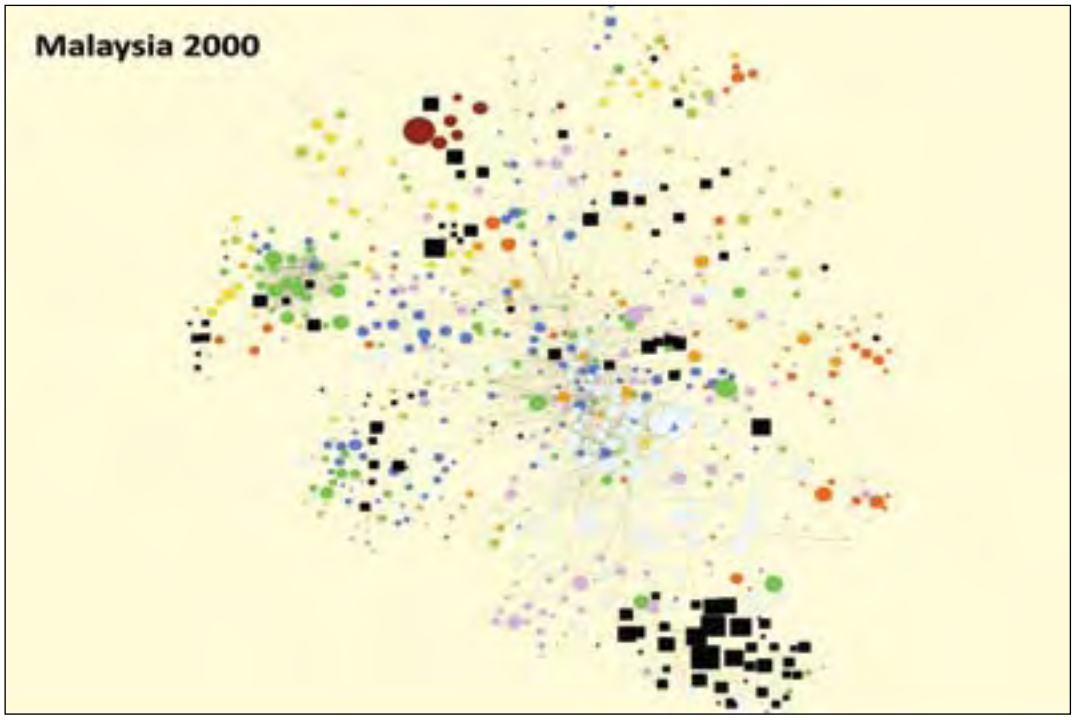

Malaysia 1975


Malaysia 1980


Malaysia 1985


Malaysia 1990

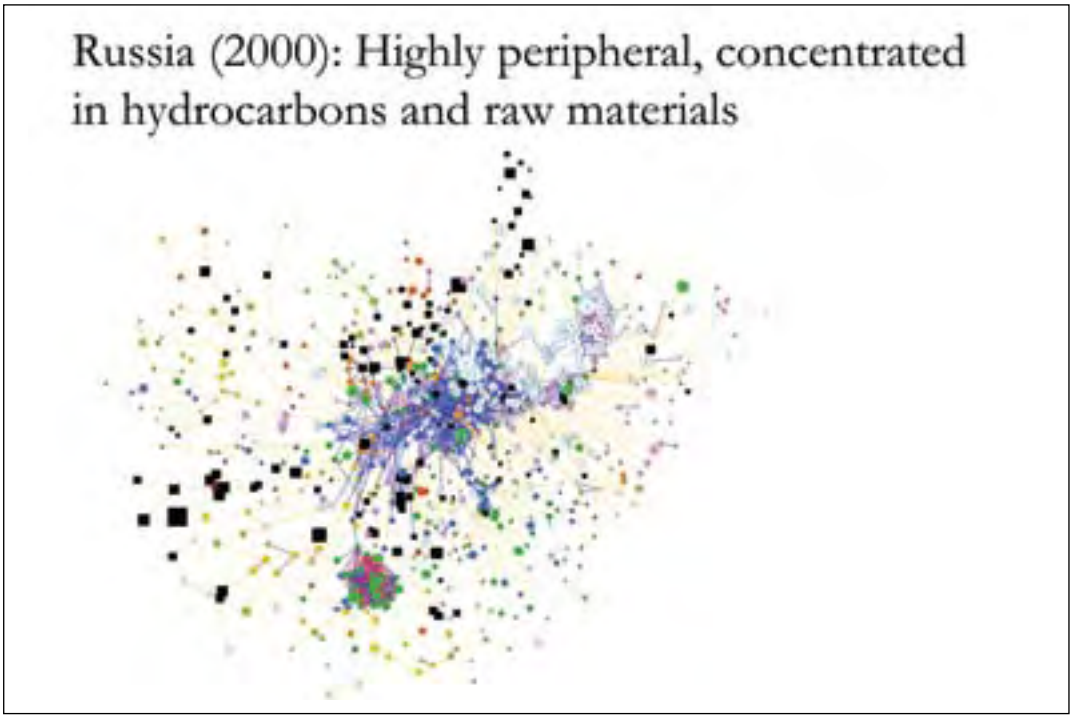

Malaysia 1995


Malaysia 2000

Key Implications

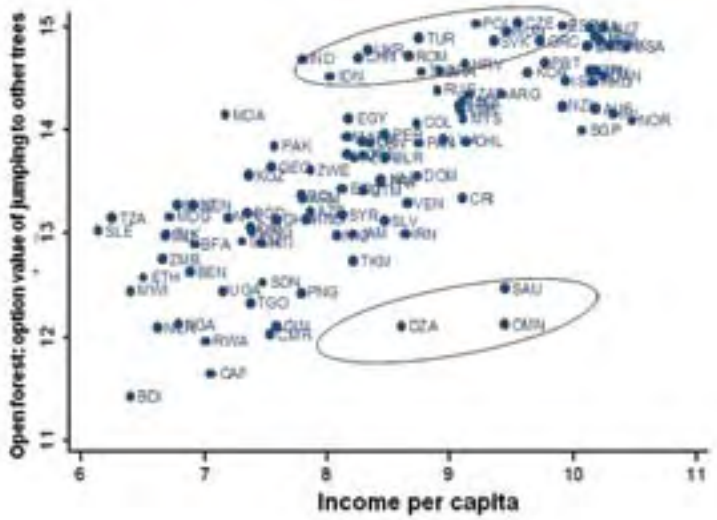
- Monkeys jump short distances
- So, where you are now in the product space determines where you can jump
- In the case of Malaysia, they moved to and dominated the electronics cluster
- How are the ECA countries placed in this space?

Poland (2000): very well connected & diversified (although no presence in electronics)

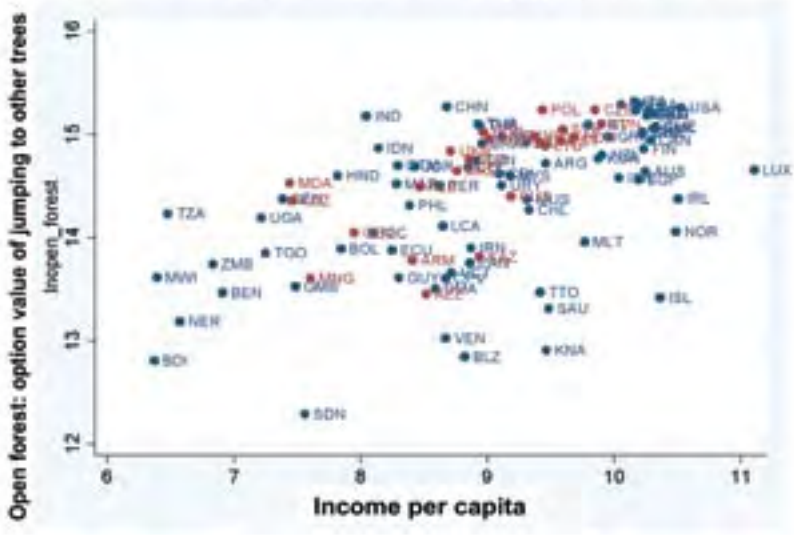

Russia (2000): Highly peripheral, concentrated in hydrocarbons and raw materials


The Ukraine (2000): somewhere in between- more connected than Russia, not as well connected as Poland

Summarizing this 'connectedness' with one number: Open Forest

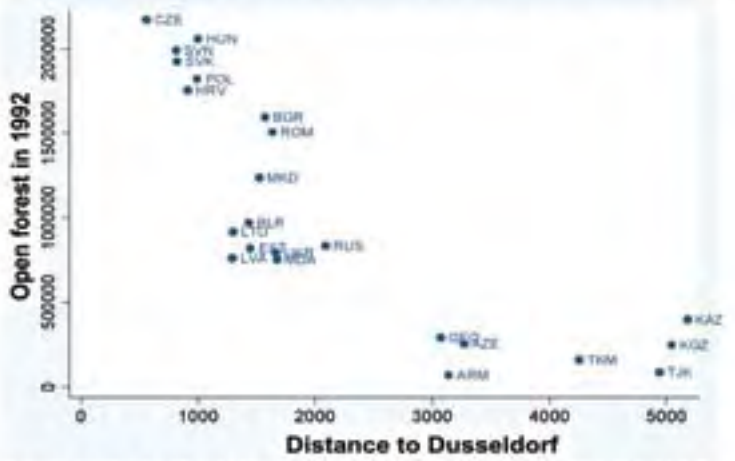


Countries in Eastern Europe and Central Asia face very different opportunities



Countries with a better-connected export basket did not suffer as deep an output collapse during transition

..and tend to be those closer to the west.

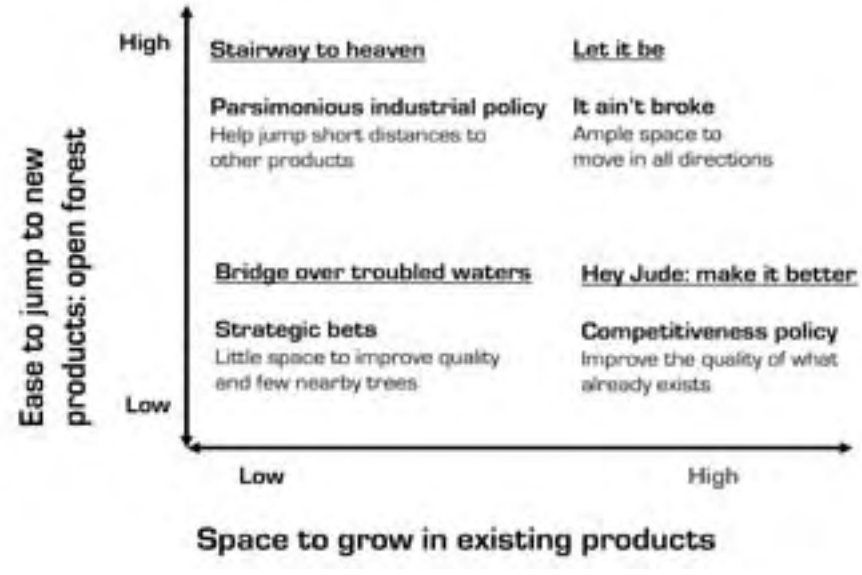


- But proximity to the West has no effect on transition beyond its impact on the export mix: open forest trumps distance to Dusseldorf in a cross-country regression

Some implications

- Why do many poor countries not catch up to rich countries?
  - Because there is no "stairway to heaven" or sequence of nearby trees that can get them to the denser parts of the product space
- What causes the "resource curse" (bad performance by resource rich countries)?
  - Poor connectedness of the resource intensive sectors
- Add value to your raw materials?
  - Forward supply linkages vs capabilities
  - Finland
- Why do countries fall into protracted slumps?
  - Because their existing export products get into trouble when they are in a part of the forest where there are no nearby trees
- Is innovation the solution?
  - It is about finding profitable excuses to accumulate capabilities that will be used for some other purpose down the road

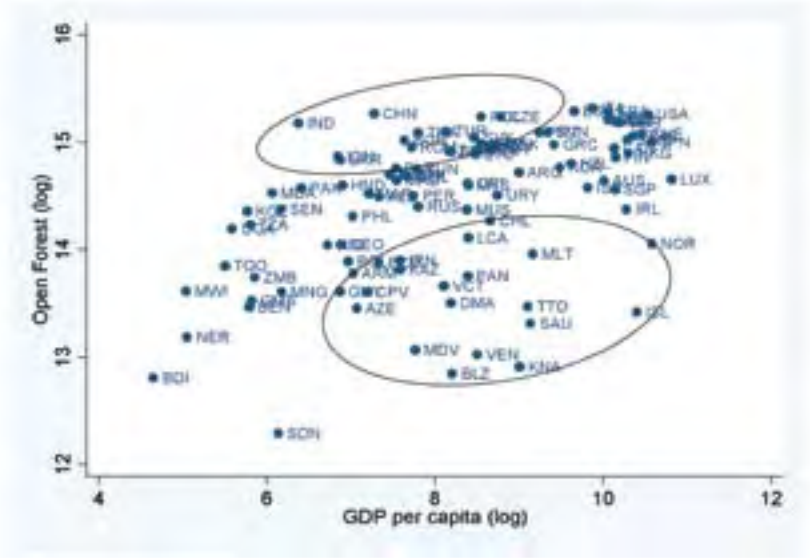
Strategic approaches



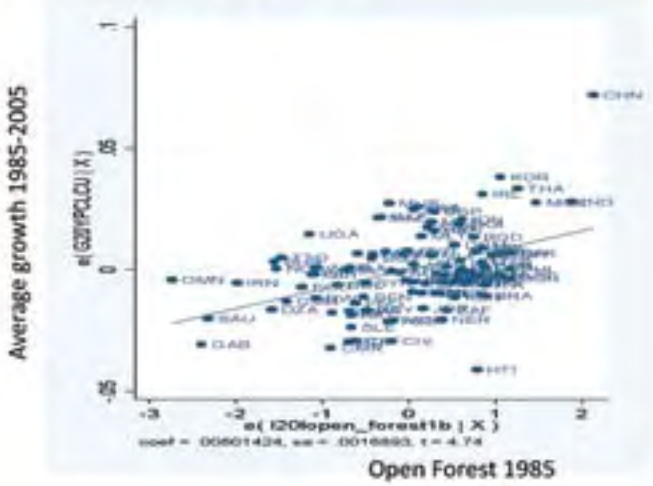
Where are the countries?

Where are the countries?

Countries face different opportunities to jump to other trees



Countries with closer nearby trees grow faster



Implications

- Development is about a stepping stone process to solve the chicken and egg problem
- Much of oil and mining is too disconnected to help trigger a transformation process
  - Dedicated rail and ports
  - Few forward and backward linkages
- But there are some spillovers
  - The Steam Engine
  - Medellin gold mining and universities
- You need not jump from there
  - Adding value to your natural resource endowment is not what Norway, Australia or Chile do
  - They have other unrelated sectors

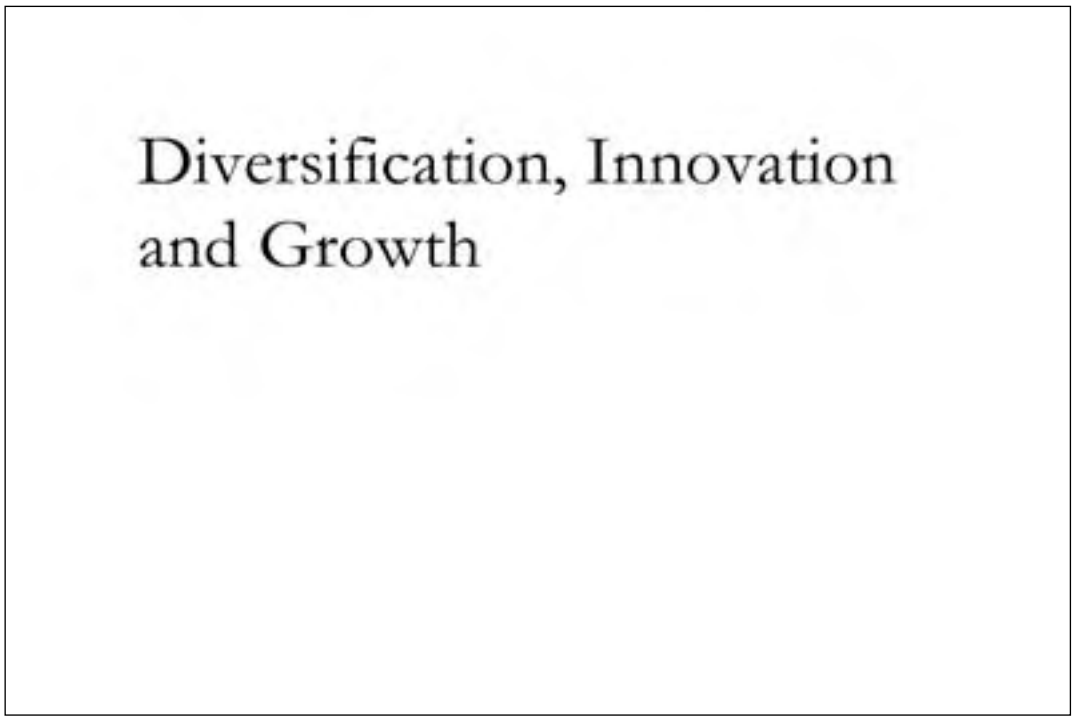
Implications

- A commitment to diversification is key
- It implies a commitment to protect the level and stability of the real exchange rate matters
  - Fiscal stabilization
  - But also a role for monetary policy
- But also a willingness of the government to address chicken and egg problems
- Especially those related to the provision of public inputs

Diversification, Innovation and Growth

William F. Maloney, Lead Economist, Development Research Group, World Bank
Wmaloney@worldbank.org

William Maloney argued that an economy, in order to grow, needs skilled workers, strong entrepreneurship, and a diversified product portfolio. According to him, three strategies for diversification, innovation and growth can be distinguished: firstly, from diversification to income (a diversified portfolio works as a damper to sector-specific trade shocks); secondly, from income to diversification (demand-driven), thirdly, comovement of diversification and income (new products embody TFP growth).
At the same time, according to Maloney, countries should continue doing things that they already do better than others. In general, rich countries produce high-risk products (possible high return), whereas poor countries generally offer low-risk products (low return). For the latter, it is hard to move to high-risk products. These countries need tools in order to reach this aim (e.g. innovative products and R&D).
Since innovation and R&D are highly correlated with the capital intensity/wealth of an economy, tools such as management/guidance, organization and support for R&D determine the economic performance of a country.

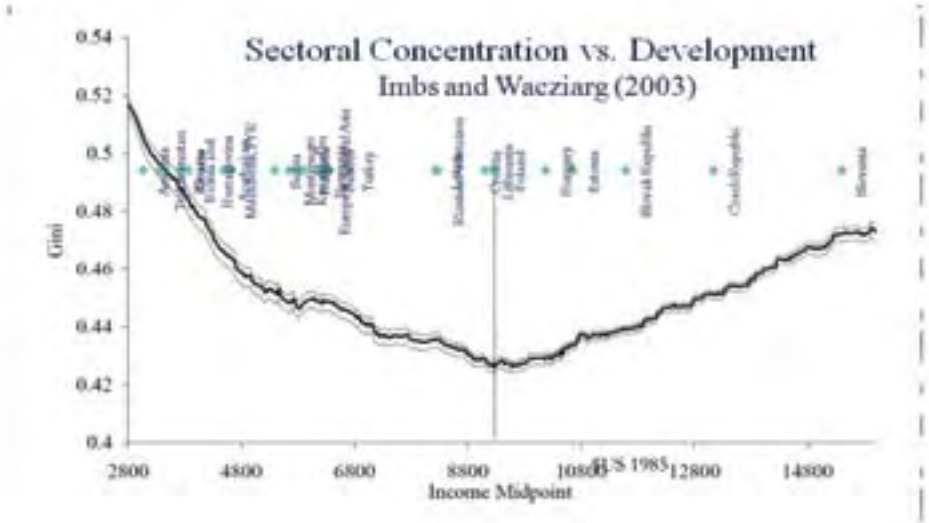


Three Issues

1. Diversification vs. innovation and growth
2. Doing what we do better
   1. Natural Resources
   2. Export Quality
3. 2 queries on thinking about the innovation environment

Pasteur: "Chance Favors the Prepared Mind"

ECA: Some countries likely to diversify, some not



What does this relationship mean?

1. From diversification to income:
   - Specialization leads to gains from trade (Ricardo, Krugman)
   - Diversified portfolio dampens sector specific shocks
     - Only clear negative effect from Natural Resources
   - For small countries, there must be a trade off of the two
     - Other ways of managing shocks? Sovereign wealth funds?
2. From income to diversification:
   - Taste for diversity-if opening new sectors is costly then economy will become more diverse with income.
   - Diversification an outcome of development

What does this relationship mean?

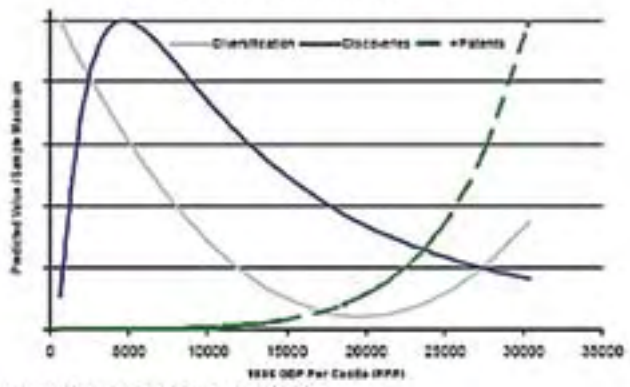
3. Co-movement of diversification and income?
   - Discovery of new goods (ideas) embodies TFP growth
   - Theoretically, no better or worse than productivity gains in existing sectors.
   - But, becomes partly an issue of innovation

Diversification as a specific innovation policy is tricky

- Diversification an outcome of difficult to predict productivity shocks/opportunities?
  - Exports very concentrated and unsystematic (Easterly et al 2009)
  - Following existing patterns not obviously helpful
    - Market saturation? Past as prologue?
- There are market failures in experimentation- discovery
  - But these appropriation externalities held in common with ongoing products as well
  - Often emerge from existing industries -Nokia
- Innovation policy
  - Be prepared to take advantage of advances in what we do
  - Be prepared to take advantage of new products
  - Mixed support products (e.g.Tekes)

Eventually, development may be about doing fewer things better

Figure 1: Diversification & Innovation



Source: Klinger and Lederman 2002

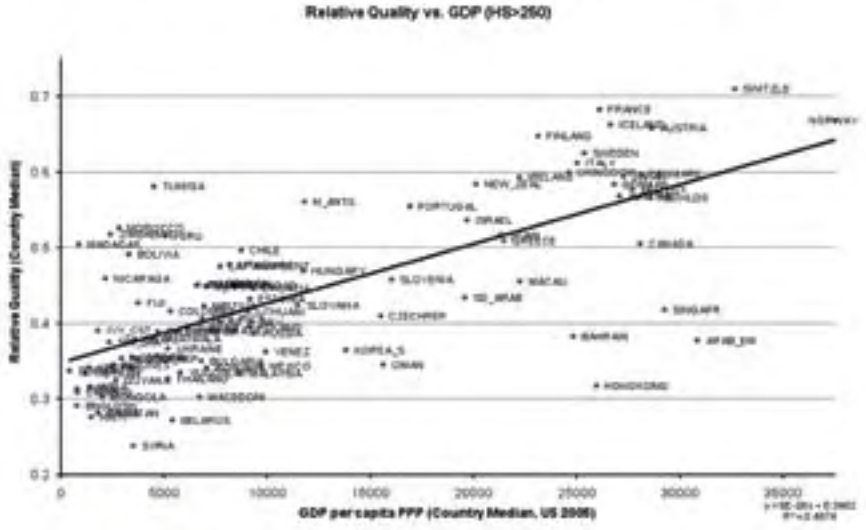
1. Natural Resources: No curse, but lots of heterogeneity in performance

- The resource curse has no statistical support:
  - Brunschweiler et. al.(2008), Lederman and Maloney (2006), Sala i Martin et. al, (2004).
- But need to understand heterogeneity of experiences:
  - Forestry: Dynamic in Finland, Sweden but not in many LDCs
  - Mining: Australia, California, Canada vs. Chile, Peru
  - TFP growth slower in LDCs in both agriculture and manufacturing. (Martin and Mitra 2001)

2. Export Quality: A new lens on resources and growth

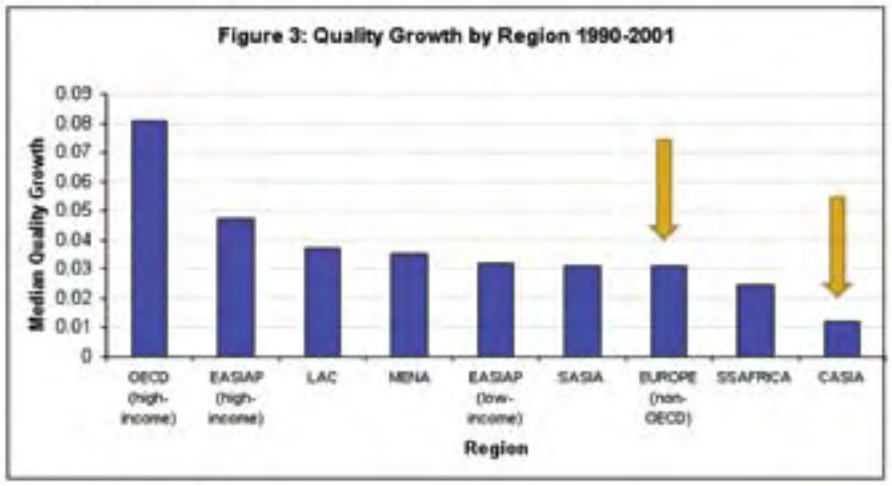
- Quality measured by price (unit value)
  - Huge variance within products (Schott 2004)
  - Standardize: $R_{itc} = \frac{u_{itc}}{u_{it}^{90}}$

Quality rises with development



Schott (2005) Krishna and Maloney 2010

Quality Growth: Are we are converging to the quality frontier?



Krishna and Maloney 2010

Convergence appears to be related to ability to place risky betss

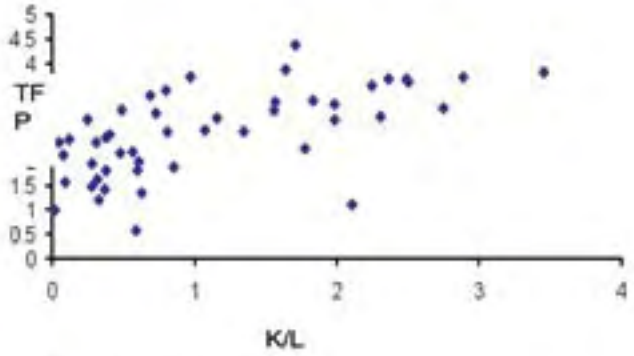
Krishna and Maloney 2010

This appears to be related to:

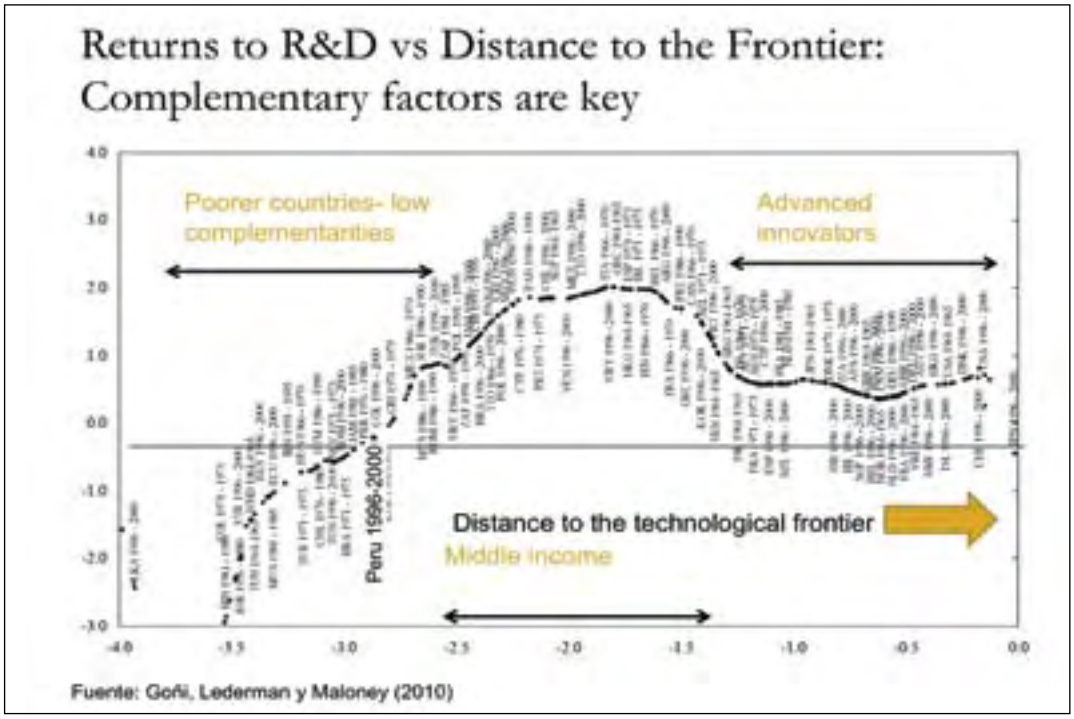
- Financial Intermediation: (credit by deposit money banks as a share of GDP)
- Innovation Effort: (R&D/GDP)
  - inability to resolve market failures/indivisibilities around innovation and R&D leads to less complex, less risky products

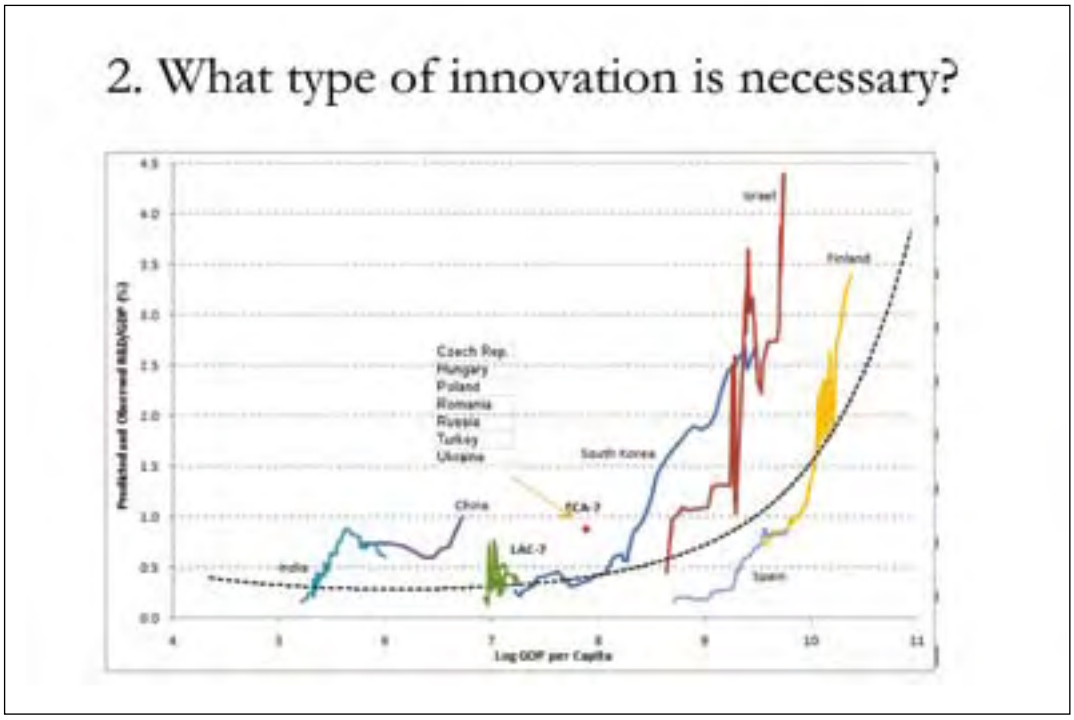
1. A problem of accumulation of knowledge, or of accumulation in general?

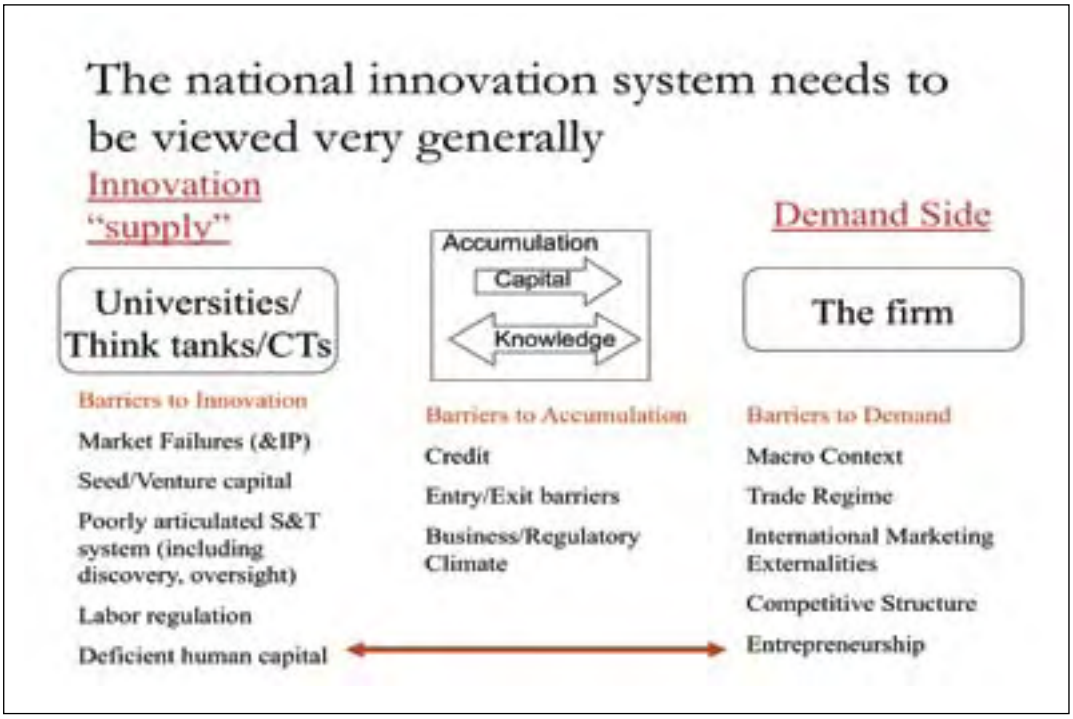
TFP vs Capital Intensity



Source: Rodriguez y Maloney (2005)


Returns to R&D vs Distance to the Frontier:
Complementary factors are key
Poorer countries- low complementarities
Advanced innovators
Peru 1996-2000
Distance to the technological frontier
Middle income
Fuente: Goñi, Lederman y Maloney (2010)


2. What type of innovation is necessary?
Israel
Finland
Czech Rep.
Hungary
Poland
Romania
Russia
Turkey
Ukraine
South Korea
China
ECA-7
LAC-7
India
Spain
Log GDP per Capita


The national innovation system needs to be viewed very generally
Innovation "supply"
Demand Side
Accumulation
Capital
Knowledge
Universities/ Think tanks/CTs
The firm
Barriers to Innovation
Market Failures (&IP)
Seed/Venture capital
Poorly articulated S&T system (including discovery, oversight)
Labor regulation
Deficient human capital
Barriers to Accumulation
Credit
Entry/Exit barriers
Business/Regulatory Climate
Barriers to Demand
Macro Context
Trade Regime
International Marketing Externalities
Competitive Structure
Entrepreneurship

Panel Discussion

Moderated by Indermit Gill, Chief Economist, ECA, World Bank
Igill@worldbank.org

Bozidar Djelic, Deputy Prime Minister and Minister of Science and Technological Development, Serbia
kabinet.potpredsednika@gov.rs

Bozidar Djelic found that the successful development of a country is strongly influenced by soft factors such as ideology (determines market structure, e.g. South Korea's path to a free-market economy), openness (determines R&D, e.g. gene technology, renewable or atomic energy), culture (gender equality, women in R&D, education), and resilience (many failures before success), and by whether a country belongs to the elite of producers (Switzerland).
According to Bozidar Djelic, successful development depends on finding ways to recruit skilled workers and to support entrepreneurs, and turning "brain drain" into "brain gain" and on not being afraid of failures.

Nerses Yeritsyan, Minister of Economy, Armenia
nyeritsyan@mineconomy.am

Nerses Yeritsyan emphasized the importance of long-term development strategies and tolerance towards failures of new ideas and towards possible capital investment failures. With regard to Armenia, he identified a lack of support measures for SMEs and of entrepreneurial spirit.
According to Yeritsyan, a development strategy should focus on identifying and supporting key entrepreneurs, of having patience on the path to success, on supporting companies to find an individual niche (not copying others) and on creating the necessary infrastructure for companies.

Plenary III: Supporting Innovative SMEs

Innovation and technology absorption in SMEs constitute an important channel of growth for Germany. To an equal extent, they are a critical channel for ECA's post-crisis growth. Thus, selecting the right policies and instruments for public support of innovation and absorption is crucial for the economic development of ECA countries.

This session focused on public support programs in East Germany, and especially in Saxony with a view to drawing lessons for ECA. The Neue Länder (new German federal states) and the countries of the ECA region alike are confronted with the post-transition challenges of establishing an innovation-friendly investment climate and new institutions. In Germany, specific government support programs have been developed to strengthen the innovativeness of SMEs under the particular circumstances prevalent in East Germany. The session outlined such support programs of different political levels, and their impact on the innovativeness of SMEs, aiming at identifying potential lessons from the support programs in East Germany for ECA countries.

Post-Transition Technology Absorption – What Can ECA Learn from Germany?

Itzhak Goldberg, Former Advisor, ECSPF, World Bank
Igoldberg@worldbank.org

Itzhak Goldberg drew lessons from Eastern Germany's transition towards an innovation economy.
According to Goldberg, innovation in a transition country can take two forms; absorbing (solu-tions new to the country) or inventing (solutions new to the world). Most SMEs in developing countries follow the first path, which often requires significant R&D efforts for reverse engineering (e.g. pharmaceuticals). However, transition countries are different from other developing countries in having a highly industrialized yet often outdated and in huge parts obsolete economy. Therefore, in order to prepare a fertile ground for innovative SMEs, restructuring is needed and should result in a "clean plate". The old conglomerates should not hinder innovation.
Itzhak Goldberg suggested focusing on absorption and encouraging it through the promotion of new production processes and machinery. This requires new skills from the labor force and, ultimately, leads to higher productivity as well as an increase in innovative capacity.

What is an innovative SME – Inventing or Absorbing?

- Absorption = incremental = new-to-country but not new-to-world
- Absorption ►►► key to Japan, China and India
- R&D = pre-requisite for Absorption, not only for innovation
- Restructuring – post-transition technology absorption ►►► discontinued production line, upgrading lines (see below)

Post-crisis Growth – Whence?

- In ECA, capital is scarce and labor costly, relative to Asia; no cost-based competitiveness ►►► Need technology absorption to help export-oriented diversification.
- Technology Absorption Channels in SMEs:

  (i) Participate in world R&D and support firms getting into global markets

  (ii) Encourage spin offs and R&D collaboration (portability, researchers' IPRs)

Enterprise Perceptions: Investment Climate in Germany, Poland and Czech R.

Poland	East Germany	West Germany	Czech Rep.	Spain	South Korea
906	354	718	316	550	536

Subset of Enterprise Survey 2005, including 1260 firms with less than 250 employees

Firms claiming major obstacle in... [%]

Factor \ Country	Poland	East Germany	West Germany	Czech Rep.
Tax rates	59.0	35.8	26.6	60.7
Regulatory uncertainty	43.1	8.5	5.0	21.4
Cost of financing	45.8	29.8	13.2	18.4
Macroeconomic instability	39.9	21.9	11.6	18.4
Tax administration	38.3	30.1	20.1	52.9
Access to financing	35.3	28.6	10.3	18.8
Functioning of judiciary	21.9	6.2	.6	25.2

Source: WB Enterprise Surveys

Technology Absorption – Enterprise Surveys Indicators – Germany, Poland and Czech R.

Initiatives of company over the last 36 months [%]

	% of firms that have undertaken the initiative within country			
	Poland	East Germany	West Germany	Czech Rep.
Added new product	**34.7**	**11.0**	**18.2**	**18.0**
Upgraded existing product	**49.0**	**29.1**	**49.3**	**29.7**
Discontinued product line	11.5	5.4	14.6	9.8
Obtained ISO	12.4	8.2	3.3	9.5

Source: WB Enterprise Surveys

Do we know how to support absorption rather than innovation?

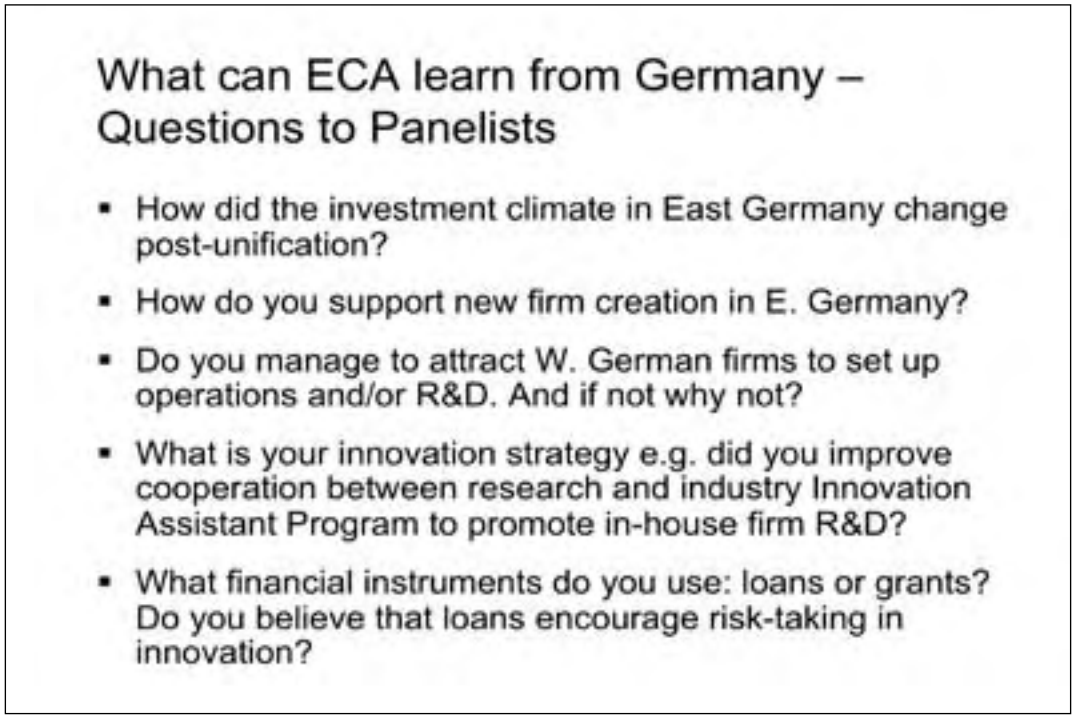
- In principle, we know why/how to subsidize innovation. But…
- Why subsidize technology absorption?
- Matching grants: OK for licensing, export promotion, consultancy. But…
- Most absorption is via new machinery and equipment – do we subsidize capital assets?
- or the R&D / skills needed to properly adapt technology and workforce to new tech?

Public Support for Innovation – and what can ECA learn from Germany?

- **Matching Grants** for R&D in enterprises and support for Venture Capital (VC) -- successful in the US (SBIR, ...), Finland (TEKES, …), Israel (OCS/Yozma)

▪ Grants	▪ State support for VC
- mixed results in Poland,	- problematic in Russia (RVK – no pipeline)
- successful in Croatia	- problematic in Croatia (VC no pipeline)
- successful but miniscule in Russia (Bortnik)	- problematic in Poland (only large)

- And today we will hear from High-Tech Gründerfonds in Germany whether this model is working


What can ECA learn from Germany – Questions to Panelists
How did the investment climate in East Germany change post-unification?
How do you support new firm creation in E. Germany?
Do you manage to attract W. German firms to set up operations and/or R&D. And if not why not?
What is your innovation strategy e.g. did you improve cooperation between research and industry Innovation Assistant Program to promote in-house firm R&D?
What financial instruments do you use: loans or grants? Do you believe that loans encourage risk-taking in innovation?

Entrepreneurial Regions – the BMBF Innovation Initiative for the New German Länder

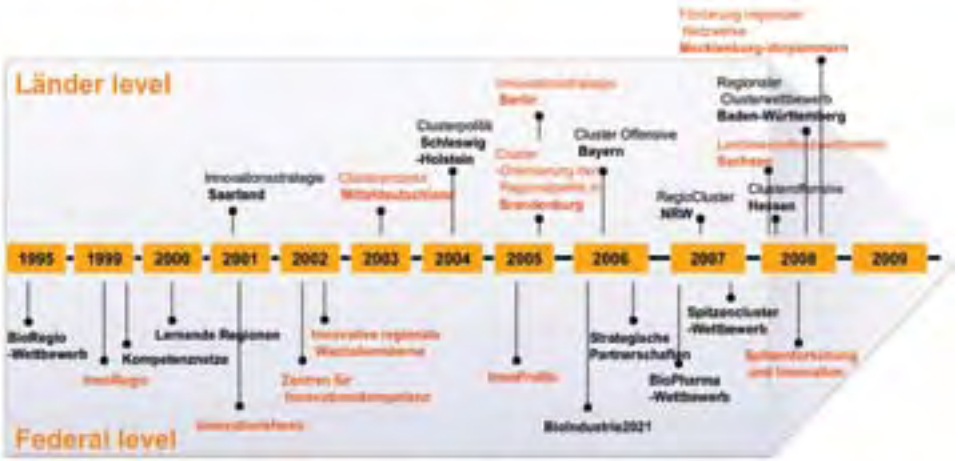
Engelbert Beyer, Head, Directorate for Innovation Strategies,
Federal Ministry of Education and Research (BMBF), Germany
Engelbert.Beyer@bmbf.bund.de

Engelbert Beyer introduced the program "Entrepreneurial Regions" as part of the German High-Tech Strategy.
With the High-Tech Strategy, the German government has, for the first time, formulated a national strategy for innovation policy. Clusters and the combination of competencies constitute one of the Strategy's focal points. The program "Entrepreneurial Regions" includes a toolbox tailored towards the regional peculiarities of the New Länder. Over the course of the past two decades, East Germany's research landscape has become competitive. Moving forward, one of the most important aspects will be a greater degree of flexibility in terms of research initiatives.

The High-Tech Strategy for Germany

- For the first time a national strategy for innovation policy
- Specific strategies for individual fields of technology and application: analysis – definition of aim – joint action
- Concrete cross-section activities for an improved cooperation between research and industry
- Innovation-friendly framework conditions for a positive innovation culture
- Innovation policy with great stamina

Public Measures for Cluster and Network Support in Germany (1995-2008)



Innovation policy in Germany is more and more linked to cluster and network concepts!


Initial Situation in the New German Länder
Structural Problems and Deficits in the New Länder
Still gap in value creation in comparison to the Old Länder
Lack of jobs and opportunities for vocational training
Migration to the Old Länder as well as low birth rate
Few large-scale enterprises with own research department
Many small and very small enterprises with low equity ratio
High barriers to market entry for new products

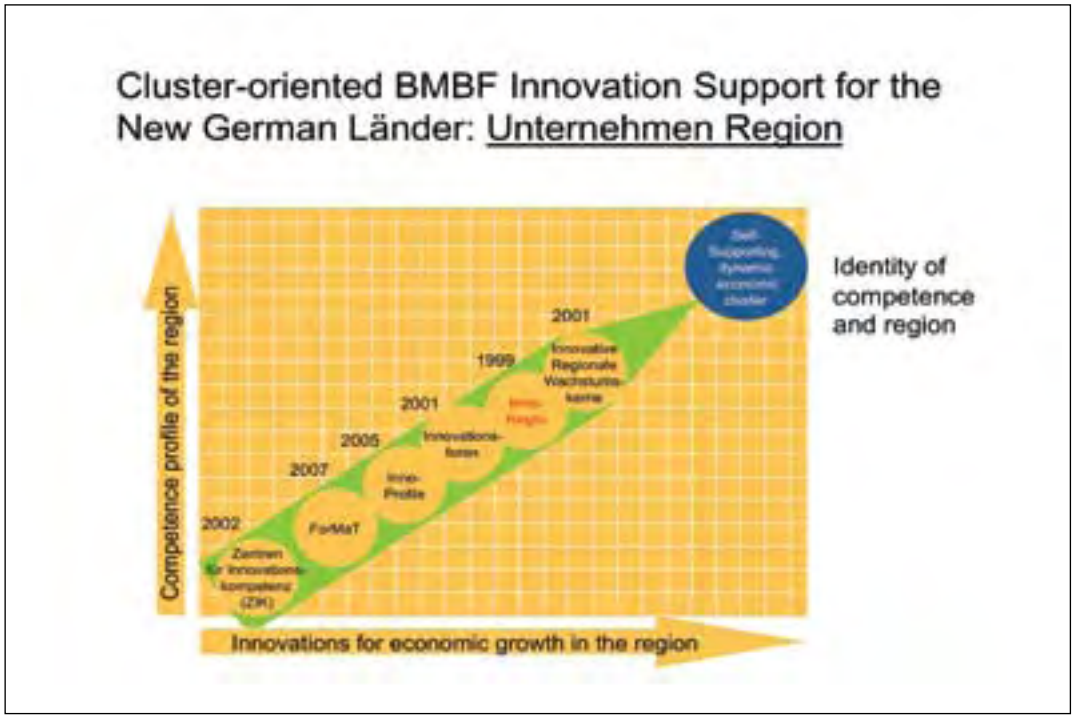

Principles of an Innovation Policy
Innovation policy must have the whole innovation process in mind and systematically offer suitable instruments.
Innovation policy therefore has to be strategically designed and reliable for the actors of the process.
Innovation support must focus on outstanding innovation potentials ("strengths", "unique features").
Innovation support has to link research and development to a clear exploitation concept from the outset.
Innovation support must encourage people's own initiative and responsibility.

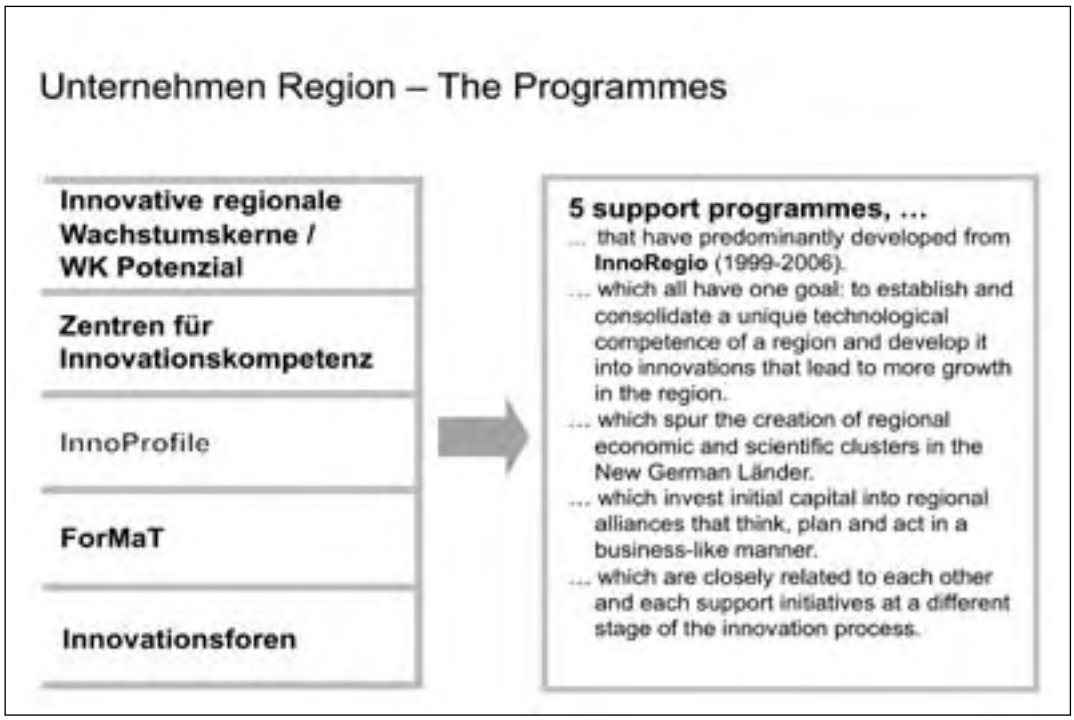
Support Principles of Unternehmen Region – 1

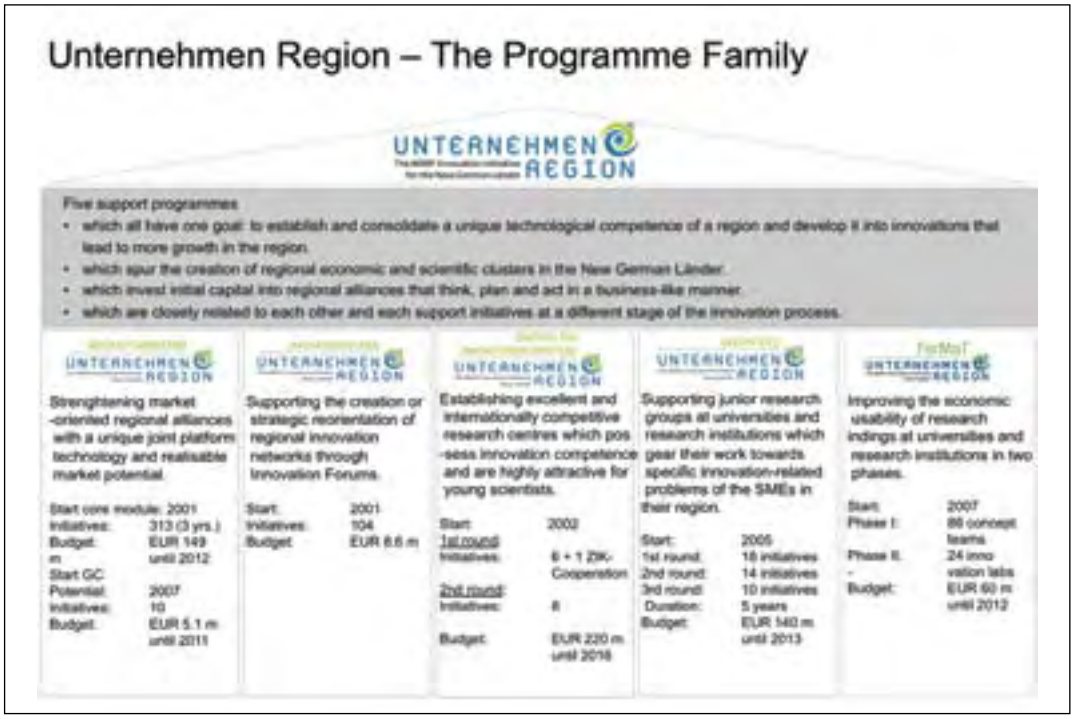
- The BMBF supports existing **strengths and potentials of a region**, which are usually based on a special technological competence.
- A regional alliance commanding such specific strengths has to develop a **strategy** aimed at boosting this **core competence** and at making it a success in the market.
- The regional alliances form in a **bottom-up** process. This means that no regions, actors, industries or technologies are designated for support beforehand.

Support Principles of Unternehmen Region – 2

- Quality, competence, strategy and the analysed market potential are decisive for support.
- The support funds of the BMBF serve as **start-up capital and investments** for regional alliances acting with entrepreneurial vision.
- Unternehmen Region uses all available **support instruments** (project support R&D, education, surveys, consulting etc.).


Cluster-oriented BMBF Innovation Support for the New German Länder: Unternehmen Region
Competence profile of the region
Innovations for economic growth in the region
Identity of competence and region
2002
2005
2007
2001
1999
2001
ForMaT


Unternehmen Region – The Programmes
Innovative regionale Wachstumskerne / WK Potenzial
Zentren für Innovationskompetenz
InnoProfile
ForMaT
Innovationsforen
5 support programmes, …
… that have predominantly developed from InnoRegio (1999-2006).
… which all have one goal: to establish and consolidate a unique technological competence of a region and develop it into innovations that lead to more growth in the region.
… which spur the creation of regional economic and scientific clusters in the New German Länder.
… which invest initial capital into regional alliances that think, plan and act in a business-like manner.
… which are closely related to each other and each support initiatives at a different stage of the innovation process.


Unternehmen Region – The Programme Family
UNTERNEHMEN REGION
Five support programmes
• which all have one goal: to establish and consolidate a unique technological competence of a region and develop it into innovations that lead to more growth in the region
• which spur the creation of regional economic and scientific clusters in the New German Länder
• which invest initial capital into regional alliances that think, plan and act in a business-like manner
• which are closely related to each other and each support initiatives at a different stage of the innovation process
Strengthening market -oriented regional alliances with a unique joint platform technology and realisable market potential
Start core module: 2001
Initiatives: 313 (3 yrs.)
Budget: EUR 149 m until 2012
Start GC Potential: 2007
Initiatives: 10
Budget: EUR 5.1 m until 2011
Supporting the creation or strategic reorientation of regional innovation networks through Innovation Forums.
Start: 2001
Initiatives: 104
Budget: EUR 8.6 m
Establishing excellent and internationally competitive research centres which pos -sess innovation competence and are highly attractive for young scientists.
Start: 2002
1st round
Initiatives: 6 + 1 ZIK-Cooperation
2nd round:
Initiatives: 8
Budget: EUR 220 m until 2016
Supporting junior research groups at universities and research institutions which gear their work towards specific innovation-related problems of the SMEs in their region.
Start: 2005
1st round: 18 initiatives
2nd round: 14 initiatives
3rd round: 10 initiatives
Duration: 5 years
Budget: EUR 140 m until 2013
ForMaT
Improving the economic usability of research indings at universities and research institutions in two phases.
Start: 2007
Phase I: 88 concept teams
Phase II: 24 inno vation labs
Budget: EUR 60 m until 2012

Experiences with the Innovation Assistant Program 1995 – 2008

Peter Nothnagel, Head of Division, Saxon State Ministry for Economic Affairs; Labour and Trans-port, Germany
peter.nothnagel@smwa.sachsen.de

Peter Nothnagel introduced the "Innovation Assistant Program".
Compared with the diversification of its industry, Saxony exhibits a low degree of researchers in commercial companies. To increase the number of researchers and to support SMEs in developing their own research capacity, the program subsidizes the employment of recent graduates. Success factors of the program are a company-centered information program, clearly defined goals, a well working program administration and evaluation.

1. Framework

- Population: approx. 4.19 mill. (2008)
- Working market (population): 1.9386 mill. (2009)
- unemployment rate : 13.4 % (03/2010)
- GDP: 92.9 billions € (2009)
- R&D expenditures of industry: 901.5 mill. € (in 2005)
- Number of SME in region: approx. 148 100 (99,88% of companies) (2008)

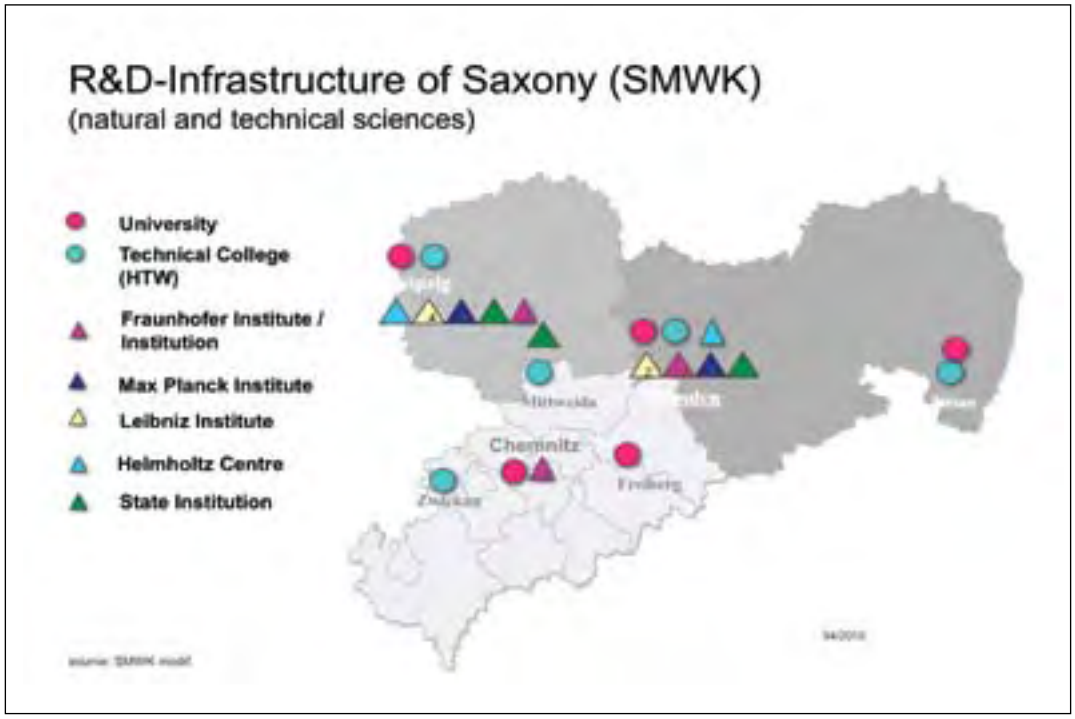
1. Framework

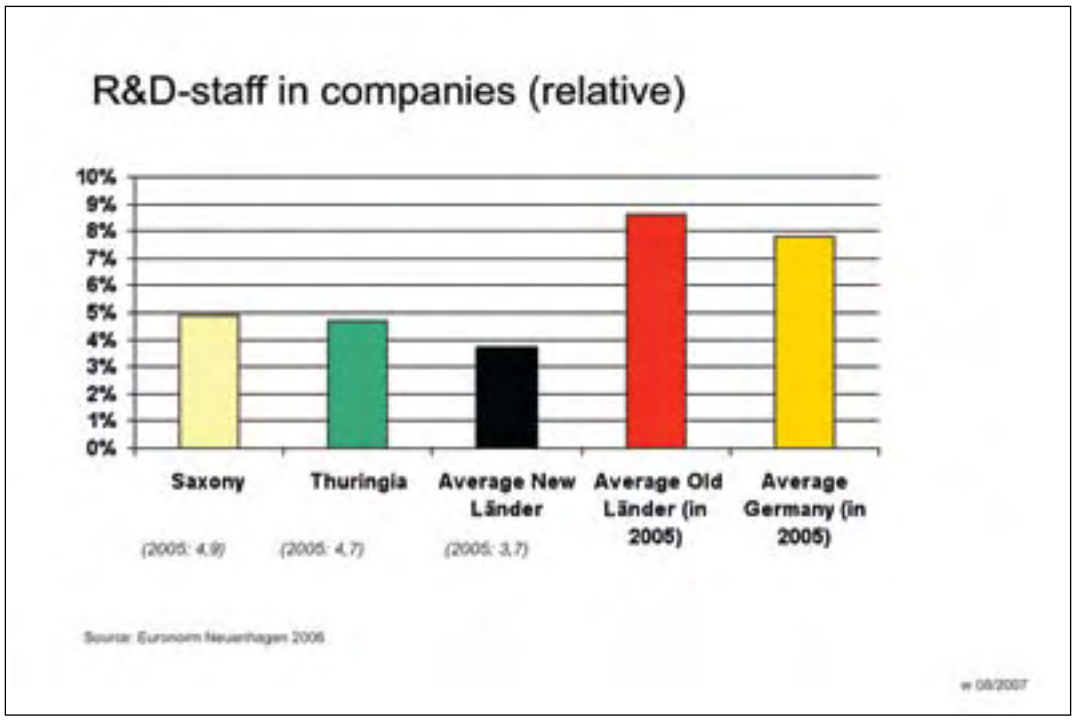
- Population: approx. 4.19 mill. (2008)
- Working market (population): 1.9386 mill. (2009)
- GDP: 92.9 billions € (2009)
- R&D expenditures of industry: 901.5 mill. € (in 2005)
- Number of SME in region: approx. 148 100 (99,88%) (2008)
- R&D infrastructure: 5 universities, 5 technical colleges, 15 Fraunhofer-institutes/ institutions, 6 Max-Planck-Institutes, 6 Leibniz-Institutes, 2 Helmholtz-Institutes, 12 non-profit research enterprises, 42 TT-centers +incubators
- Number of students: 109 213 (winter semester 2009/2010)

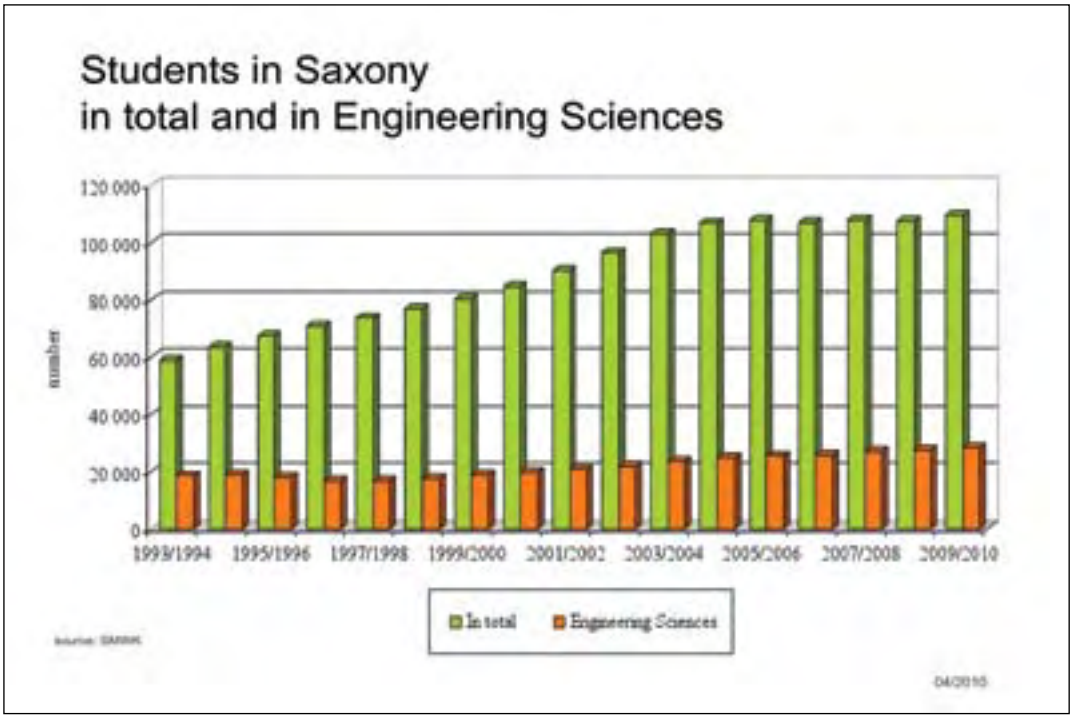
Basic economic facts

Economic growth:	- 5,7 % Saxony (2008 – 2009) (real growth of the GDP) Ø - 4,5 % Eastgermany, Ø - 6,8 % Germany
Job density:	jobs / thousand inhabitants, Ø 441 Eastgermany, Ø 491 Germany, Ø 501 old Länder without Berlin Ø 462 Saxony
Unemployment:	Feb. 2010: 13,6 % (Ø 2009: 12,9 %) City of Dresden: 12,5% City of Leipzig: 14.8 % 13,7 % Eastgermany 8,7 % Germany
Industrial R&D-staff :	ca. 45,1 % of new Länder without Berlin (2009)

High-tech competence centers in Saxony


R&D-Infrastructure of Saxony (SMWK)
(natural and technical sciences)
University
Technical College (HTW)
Fraunhofer Institute / Institution
Max Planck Institute
Leibniz Institute
Helmholtz Centre
State Institution
Chemnitz
Freiberg


R&D-staff in companies (relative)
10%
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
Saxony
(2005: 4,9)
Thuringia
(2005: 4,7)
Average New Länder
(2005: 3,7)
Average Old Länder (in 2005)
Average Germany (in 2005)



The Problem:

➔1) SME dominated economy
2) a lot of small and medium-sized companies without (or with insufficient) own R&D-capacities
3) lack of technology transfer into these companies
4) on the other hand: large number of (technical) students/year

The Reason:

➔Market failure: young graduates are quite well educated and have good chances all over Germany and Europe. Wages in Saxony are lower than in western parts of Germany. A lot of young high-potentials leave Saxony after education.

The Consequence (of course besides other initiatives):

➔Initiative to stimulate SME to hire young graduates (designed by the SMWA in 1995) to overcome market failure

2. Brief description of the instrument

- Support for the employment of graduates esp. from universities and technical colleges in small or medium-sized companies without or with insufficient R&D potentials
- Minimum duration of employment: 1 year (max. 2 years)
- Assistant - has to have "fresh knowledge" (last degree < 1 year)
- Assistant - not a relative of the company-owner
- Assistant - not already an employee of the company
- More than 2 assistants per enterprise can only be supported, if
  - the previous assistants have got permanent jobs in the enterprises,
  - at least two further jobs (per supported innovation) assistant were created in the production departments of the enterprise,
  - the proportion of R&D staff in the company is less than 30 %

The most important measures:

- Support for the employment is linked to the realisation of innovations and technology oriented projects (funded or non-funded)
- Grant of up to 50% of assistant's gross salary
- Limit of eligible costs (approx. 2800 €/month - corresponding to the current agreement on tariffs in the public sector)

The instrument is mainly aimed at:

- strengthening the economic competitiveness of small and medium-sized companies
- increasing the R&D activity of these companies
- improving the reception capacities of these companies → enable supported firms to realise joint projects with research institutes
- strengthening university - industry- links
- supporting technology transfer from universities and technical colleges
- helping to create highly qualified sustainable jobs
- contributing to diminish regional brain drain - tool against the demographic problem in Saxony

Initiator:

Saxony State Ministry for Economic Affairs, Labour and Transport - SMWA (www.smwa.sachsen.de)

(today in responsibility of SMWK - www.smwk.sachsen.de)

Implementer:

SAB The Development Bank of Saxony (www.sab.sachsen.de)

Partner:

- Commercial enterprises (as beneficiaries)
- European Union (European Social Fund - ESF as co-financing-instrument in the structural funding period 2007 – 2013; from 2000 – 2006: European Regional Development Fund (ERDF))
- Chambers of Commerce and Industry, Chambers of Crafts

3. Impact/ results

Quantitative (1995 – 9/2008)

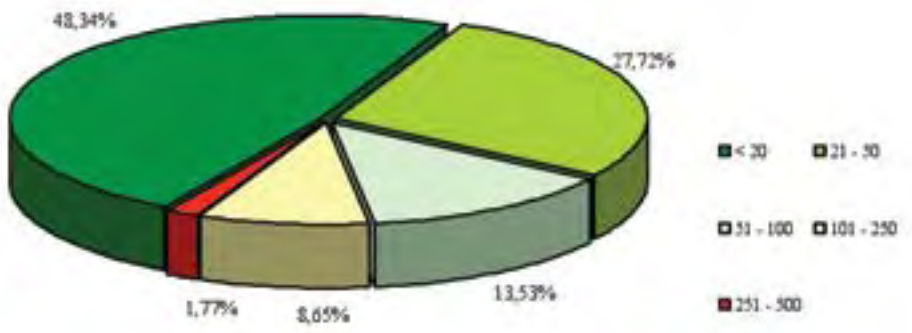
Number of supported innovation assistants	641
Project costs	appr. 51 Mill. €
Grants	appr. 22 Mill. €
New jobs	1.697

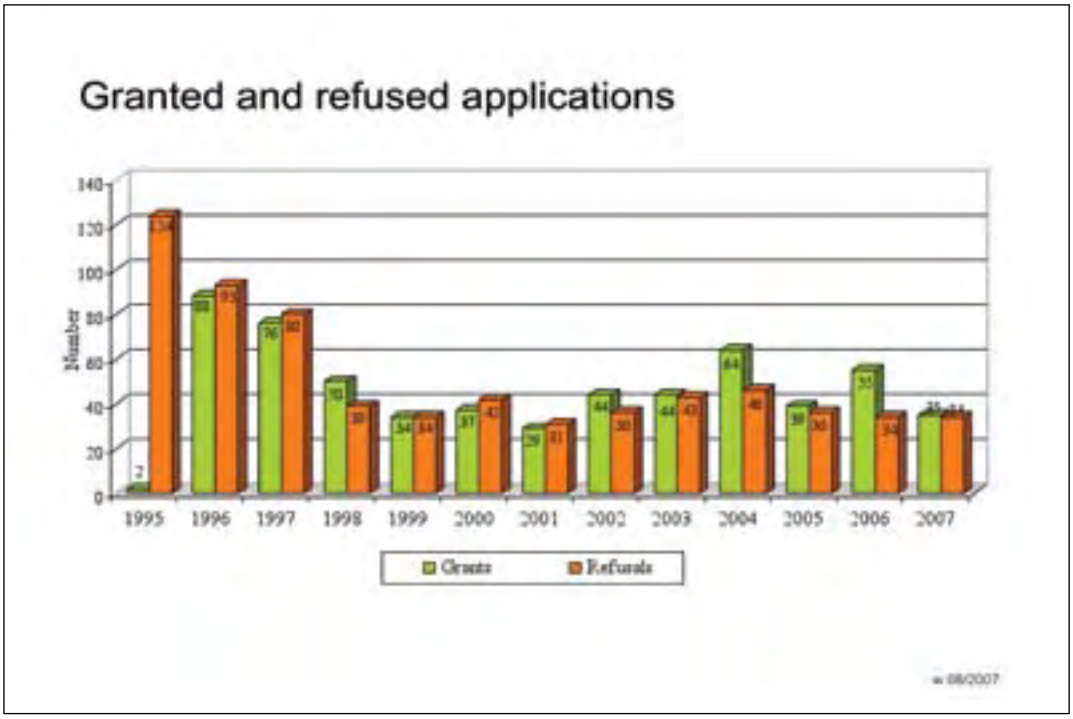
Qualitative

- Efficient instrument: good grant per 2 years/job ratio: appr.: 34 300 €/assistant (approx. 13 000 €/new job (including add. staff)
- Strenghtening the innovation force of the companies
- High percentage of satisfaction of employers with „their" assistants (87 %)

Evaluations by TU Dresden 2001 and 2008 (together with funding of R&D-projects) by Halle Institute for Economic Research - IWH (publ. 11/09 - „Sonderheft 3/2008") certified positive effects.

Size distribution of supported companies (1995-2007)





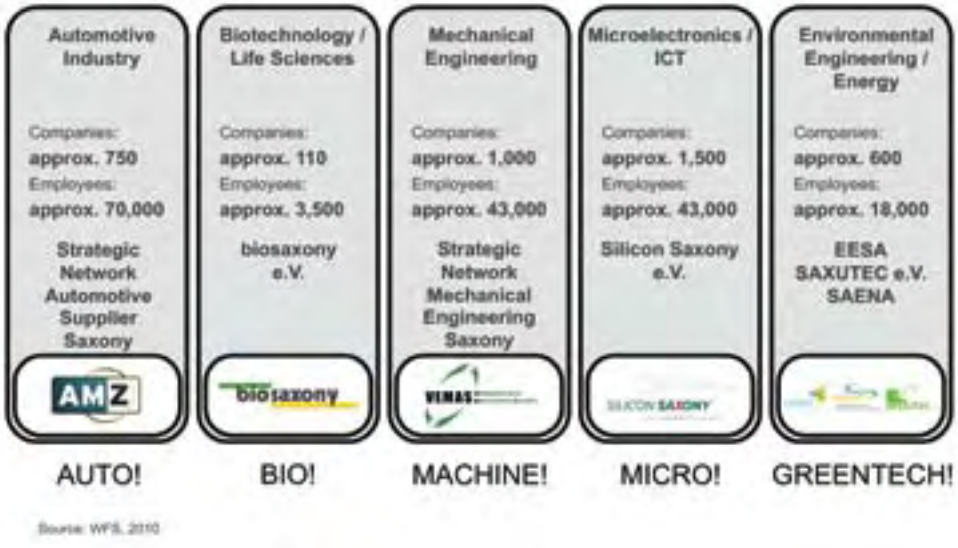
4. Success factors

1. Bringing the informations about the program to the companies (PR, SMWA, Chambers of Commerce, …)
2. Motivating partners in the universities (transfer agencies and/ or experienced people that inform students and promote the program) - own interest should be to get company-contacts for later projects
3. Continuity in the program-availability and -administration
4. Simple and transparent application procedure and treatment
5. Possibility for hire/test/fire or long-term-partnership for both sides

5. Actual modifications of the instrument (January 2010, SMWK)

- Longer duration of funded employment possible: up to 3 years
- Higher limit of eligible costs (up to 50 k€/year*)
- Grant of up to 50% of assistant's gross salary in the first 2 years and up to 25% in the 3rd year
- **In Addition**: Innovation assistant (IA) is allowed to come from a non -SME or an institute for a limited period to an SME („**borrow an IA**"). He has to be an experienced expert (minimum 5 years or doctoral degree) and gets a guarentee for the possibility to come back in the original company. In this case the maximum of eligible costs is 80 k€/year.* (Grant of up to 50% for 3 years)
  [Ratio (by numbers) of funded IA : „normal" employees <= 1:50]

Today: Main high-tech fields in Saxony

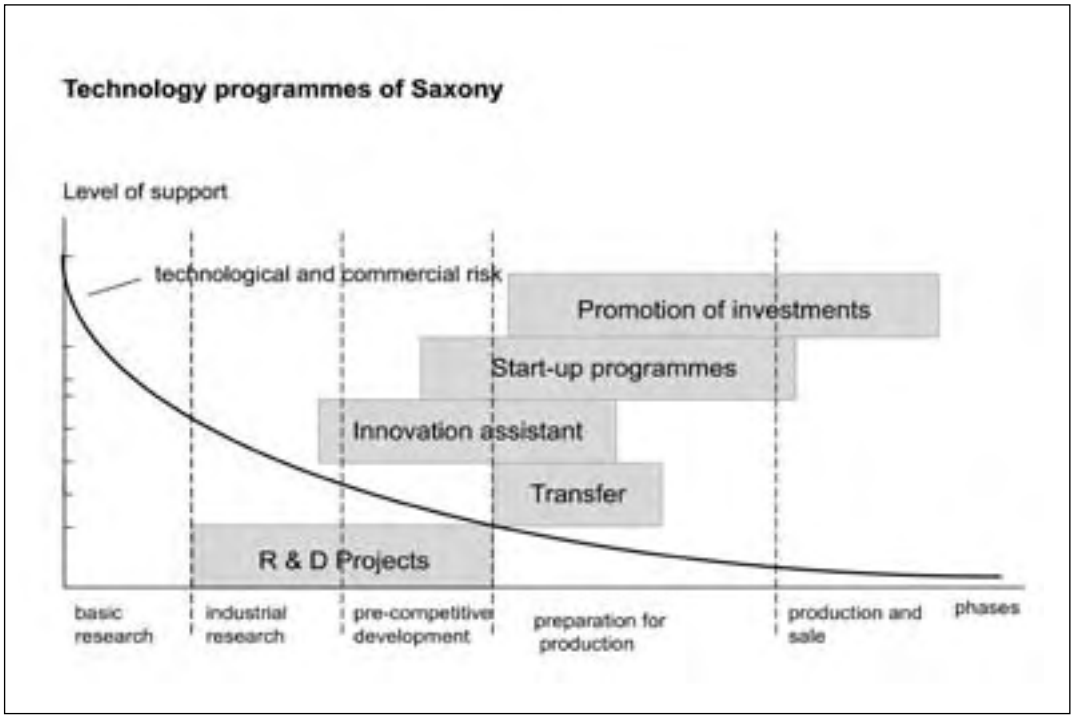


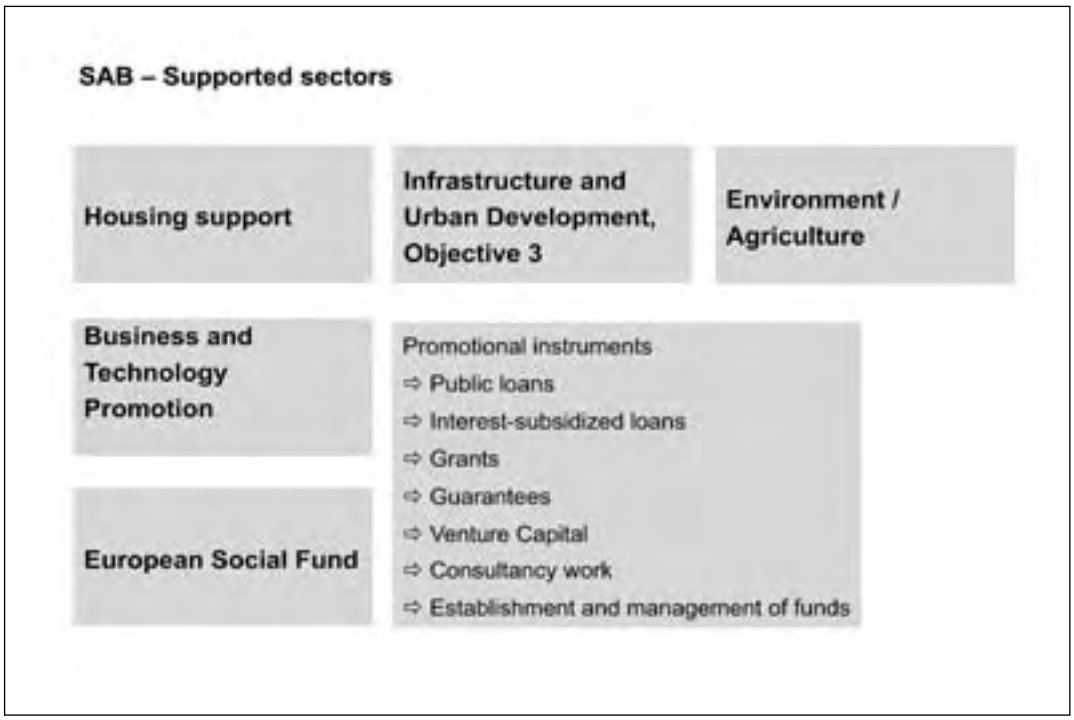
Source: WFS, 2010

Financial Instruments in Support of Innovation

Rainer Staudt, Head of Unit, Regional Development Bank of Saxony (SAB)
janine.lamprecht@sab.sachsen.de

Rainer Staudt introduced the work of the SAB (Development Bank of Saxony, Sächsische Auf-baubank).
The SAB is active in the areas of environment and agriculture, infrastructure and urban development, housing support, business and technology promotion, as well as with the European Social Fund. It offers direct consultancy services for SMEs, gives grants, arranges public loans and guarantees, and it provides access to (public) venture capital.


Technology programmes of Saxony
Level of support
technological and commercial risk
Promotion of investments
Start-up programmes
Innovation assistant
Transfer
R & D Projects
basic research
industrial research
pre-competitive development
preparation for production
production and sale
phases


SAB – Supported sectors
Housing support
Infrastructure and Urban Development, Objective 3
Environment / Agriculture
Business and Technology Promotion
European Social Fund
Promotional instruments
⇨ Public loans
⇨ Interest-subsidized loans
⇨ Grants
⇨ Guarantees
⇨ Venture Capital
⇨ Consultancy work
⇨ Establishment and management of funds

Promotion of the Innovation Process in Saxony

	SME
Industrial Research and Development	
• R & D projects in individual enterprises	
• R & D joint projects	
• Technology transfer	X
• Innovation assistant	X
Start-up Programme	
• Business plan competition Saxony	o
• Initiatives for start-ups	o
• Scholarships	o
Coaching	o
Technology and start-up funds	o
Production Process	
• Promotion of investments (grants, loans)	X
• Promotion of SME by grants (e.g. participation at fairs)	X
• Market launch of innovative products	X
• Start-up and growth financing programme	X

X exclusively

o main focus on

Lessons learnt from the crisis

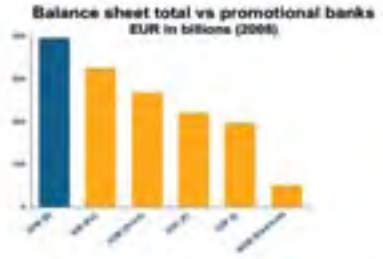
- ► Crisis especially noticeable in large enterprises and in certain sectors
- ► Advantageous economic structure with smaller enterprises in Saxony
- ► Stronger use of R & D programmes
- ► Innovative companies find better solutions to cope with this crisis

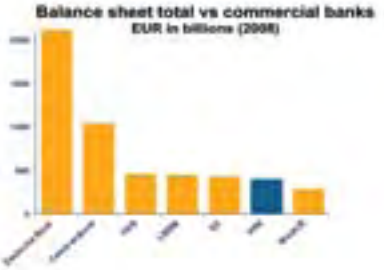
Financing Innovation
Roland Siller, First Vice President for ECA, KfW Development Bank

Roland Siller introduced the KfW Development Bank as a public institution for the financial support of SMEs and as financier of innovations. The KfW has a broad scope, supporting high-tech and innovation-based as well as traditional companies.

60 Years of KfW
Financing with a Public Mission

- **Promotional bank** of the Federal Republic of Germany
- **Founded** in 1948 as public law institution Kreditanstalt für Wiederaufbau (KfW)
- **Shareholders:** 80% Federal Republic, 20% federal states
- **Headquarters:** Frankfurt am Main
  Branches: Berlin and Bonn
- **Balance sheet (2009):** EUR 400 billion
- **Representative offices:** about 60 offices and representations worldwide
- **No of employees:** 4,265
- **Best rating:** AAA/Aaa/AAA





A Bank with a Wide Array of Roles and Functions

Approach and Volume of Innovation Financing in Germany
Role of KfW Mittelstandsbank

	2006	2007
Promotional loans	12.336,7	13.801,8
Loan programmes	10.844,2	12.048,8
thereof KfW-Unternehmerkredit	9.003,6	8.992,1
thereof innovation loans	863,0	902,0
Mezzanine programmes	1.251,5	1.214,0
thereof KfW-Unternehmenskapital	343,4	506,8
thereof ERP-Innovation-Programme	888,0	707,2
Equity programmes	341,0	339,0
thereof ERP-/EarlBonds	65,6	64,4

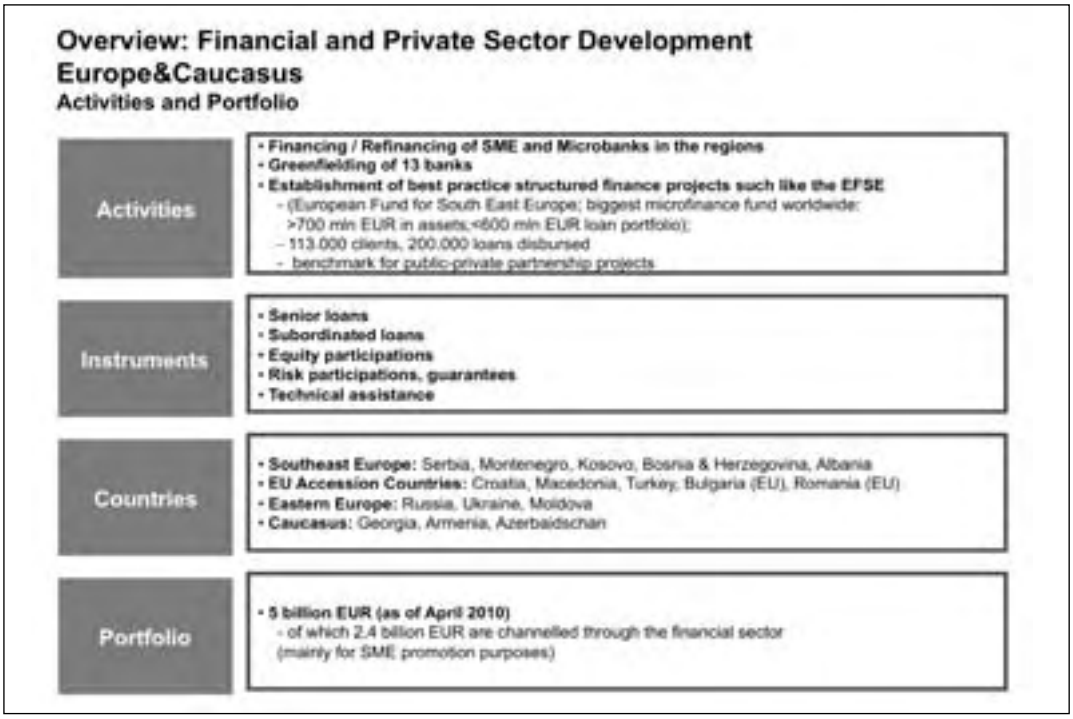
Adaptation of KfW Innovation Finance Programmes to the Russian Federation

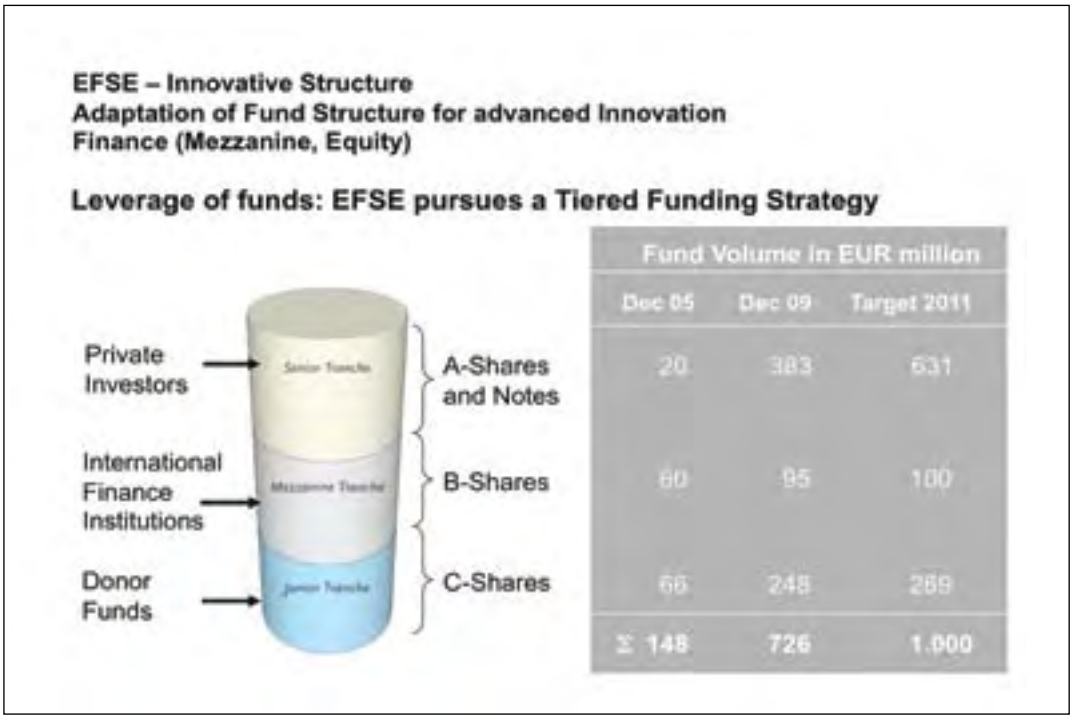
Status quo in the Russian Federation:
- Innovation definition focuses on hi-tech and global innovation concepts
- Existing promotion programmes follow that approach (hardly bankable), no SME focus

Aims of corporation between Vnesheconombank and KfW Development Bank:
- Fostering innovation on SME level
- Strengthening the Russian banking sector in terms of know-how and programmes
- Implementing a 100 mln EUR programme for Russian banks to be onlent to SME

Approach of KfW Development Bank:
- Adaptation of existing programmes to Russia; utilization of experiences in Germany
- Support in the development and anchorage of a broader innovation definition including innovative modernisation (high demand potential in Russia; bankable products possible)
- Establishment of cooperation with development institutions like Vnesheconombank and RosBR
- On-lending via eligible partner banks for risk sharing and faster market penetration (KfW-Model)
- Focus on SME as a sector with the most promissing growth potential
- Step by step approach: loan based programme followed by equity and mezzanine programmes

!! Sustainable success of the programme more important than quick wins !!


Overview: Financial and Private Sector Development
Europe&Caucasus
Activities and Portfolio
Activities
• Financing / Refinancing of SME and Microbanks in the regions
• Greenfielding of 13 banks
• Establishment of best practice structured finance projects such like the EFSE
- (European Fund for South East Europe; biggest microfinance fund worldwide:
>700 mln EUR in assets;<600 mln EUR loan portfolio);
- 113.000 clients, 200.000 loans disbursed
- benchmark for public-private partnership projects
Instruments
• Senior loans
• Subordinated loans
• Equity participations
• Risk participations, guarantees
• Technical assistance
Countries
• Southeast Europe: Serbia, Montenegro, Kosovo, Bosnia & Herzegovina, Albania
• EU Accession Countries: Croatia, Macedonia, Turkey; Bulgaria (EU), Romania (EU)
• Eastern Europe: Russia, Ukraine, Moldova
• Caucasus: Georgia, Armenia, Azerbaidschan
Portfolio
• 5 billion EUR (as of April 2010)
- of which 2,4 billion EUR are channelled through the financial sector
(mainly for SME promotion purposes)


EFSE – Innovative Structure
Adaptation of Fund Structure for advanced Innovation
Finance (Mezzanine, Equity)
Leverage of funds: EFSE pursues a Tiered Funding Strategy
Private Investors
International Finance Institutions
Donor Funds
A-Shares and Notes
B-Shares
C-Shares
Fund Volume in EUR million
Dec 05
Dec 09
Target 2011
20
383
631
60
95
100
66
248
269
Σ 148
726
1.000

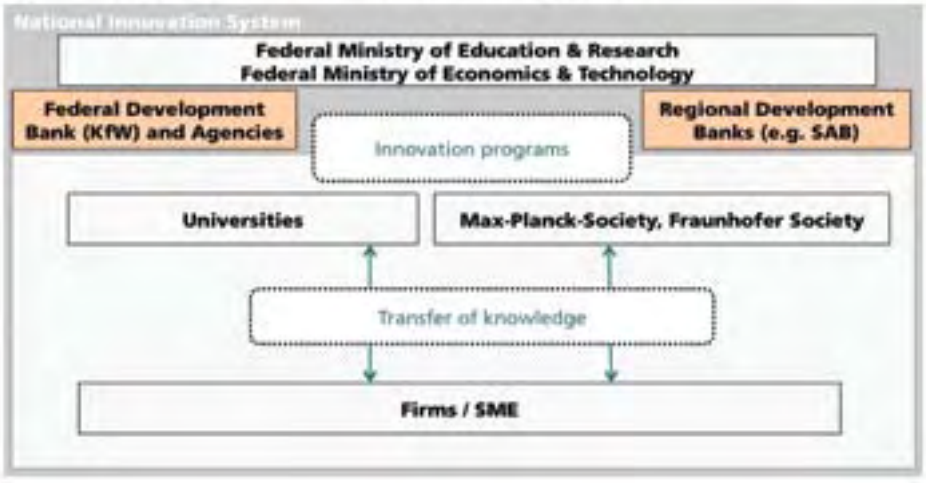
Discussant: Prof. Dr. Thorsten Posselt, Director,
Fraunhofer Center for Central and Eastern Europe (MOEZ)

Dr. Posselt presented several key insights of an evaluation of innovation support programs. According to Posselt, support programs have to be embedded in the respective national innovation system in order to ensure their consistency. Their design, monitoring and evaluation are of high importance. Program concepts and ideas have to be adapted to local circumstances. Since the capacity of human resources is limited, their development should be part of any program.

Key messages

- Support programs are embedded in the National Innovation System
- Design, monitoring, and evaluation of programs are important tasks
- Program concepts and ideas need to be adopted to countries

Example of German institutions within the National Innovation System



Design, monitoring, and evaluation of programs

- Pitfall 1: Built consistency and fit within the Innovation System
- Pitfall 2: Pay attention to the development of Human Resources
- Pitfall 3: Be aware of transfer and commercialization
- Pitfall 4: Take into account the benefits of firms and markets

Pitfall 1: Built consistency and fit within the Innovation System

- How do National Innovation Systems work?
- What is the impact of support programs for regional development?
- How to support the existing economic structures by the development of R&D structures?

Example from the US

- Small Business Innovation Research (SBIR) Program enacted in 1982
  - Awardees are exclusively US-owned small businesses
  - Small Business *Administration* changed interpretation of law and excluded venture capitalist financed firms from public support

Consistency from program design to implementation and final calculation of effects!

Pitfall 2: Pay attention to the development of Human Resources

- How to align education systems with the needs of economy?
- Which instruments for the promotion of cooperative relationships between industry and education are available and applied in practice?

Example from Malaysia

- **BioValley** was intended to nurture local research and medical discoveries and enhance commercialization
  - Lack of properly trained individuals
  - Need for understanding the entrepreneurial market
  - => „Valley of Bio-Ghosts"

Alignment of educational system towards private sector needs!

Pitfall 3: Be aware of transfer and commercialization

- How to manage and improve the knowledge and technology transfer between science and economy as well as regions and countries (institutions and processes)?

Example from the UK

- Funds for biotechnology came from state-run National Enterprise Board
  - IPR: **Celltech** received the right to refuse licences inventions => other (UK) biotech firms were unable to licence technology created with public money
  - => Focus on science => little commercialization after 10 years

Commercialization and transfer strategies of public funded research are needed!

Pitfall 4: Take into account the benefits of firms and markets

- How to closely follow the development of companies and SMEs under particular support programs?
- How to strengthen the benefits for SMEs by support programs?
- How to design support programs for SMEs to increase their ability to operate internationally?
- How to increase the competitiveness of SMEs?

Example from EU

- Insufficiently small funds => Problem: small financial support – no impact
- Excessively large programs => Problem: crowding out

Estimation of investments, impacts and leverage effects is needed!

Transferability of support programs – Hypotheses

1. **Design and fit**: Programs need to be designed carefully based on experience and they need to be consistent with the characteristics of the National Innovation System of a country!
   No easy transfer! Long experience embedded in program design.

2. **Evaluation**: Monitoring, ex post evaluation and learning processes are necessary to continously evolve and improve a program!

3. **Long-run success**: Proper design and continous evaluation are an extra effort that pay in the long run!


Fraunhofer Center for Central and Eastern Europe
(Fraunhofer MOEZ)
Applied Research in International Context:
Innovation Systems and Value Creation
Research and Education Systems
Innovative Transfer Systems
Companies and International Markets
Prof. Dr. Thorsten Posselt; thorsten.posselt@moez.fraunhofer.de
Fraunhofer Center for Central and Eastern Europe

Creating Sustainable Businesses in the Knowledge Economy

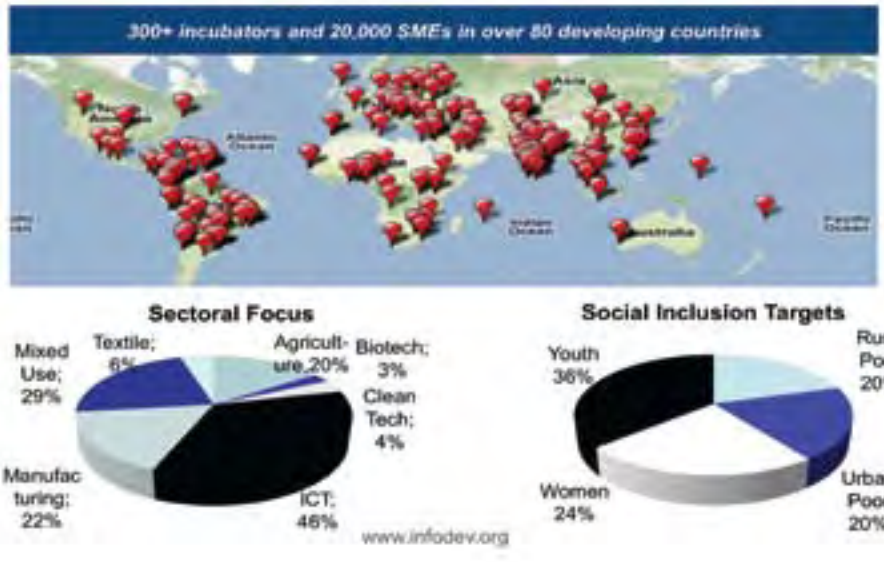
Tim Kelly, Lead ICT Policy Specialist InfoDev, World Bank
tkelly@worldbank.org

Tim Kelly introduced the InfoDev program and the World Bank implementation of the business incubator concept. According to Kelly, the three Baltic States and Poland are making great progress in these areas. The role of the World Bank includes providing technical support and grants in establishing the necessary ecosystems. Currently, a new US$20M project including three Eastern European countries is being initiated.

Creating Sustainable Businesses in the Knowledge Economy

- A public-private partnership, launched on Dec 17 2009
  - Ministry of Foreign Affairs, Finland
  - *info*Dev / World Bank
  - Nokia
    - Other partners include Mobile Monday, Korea ICT4D Fund, Ministries
- Three key areas of focus
  - Agribusiness
  - Mobile communications
  - Innovation, SME creation and supporting technology entrepreneurs
- Three regions
  - Africa
  - Asia
  - Eastern Europe, Caucasus and Central Asia (ECA)

*info*Dev's regional business incubation networks: Promoting the start-up and growth of technology SMEs



ECA Program Summary: 2010-12

1. **Establishing an ECA regional mobile applications lab**
2. **Extending mobile apps by working with Mobile Monday to establish mobile social networking hubs**
5. **Create, scale an internationalize SMEs in ECA**
   a) **Scaling business incubators and strengthening the Innovation and entrepreneurship eco-system in 3 Countries**
   b) **ECAbit projects on SME financing and impact assessment**
7. **Enhancing the competitiveness of broadband networks**
8. **Regulatory capacity building on broadband and mobile applications**

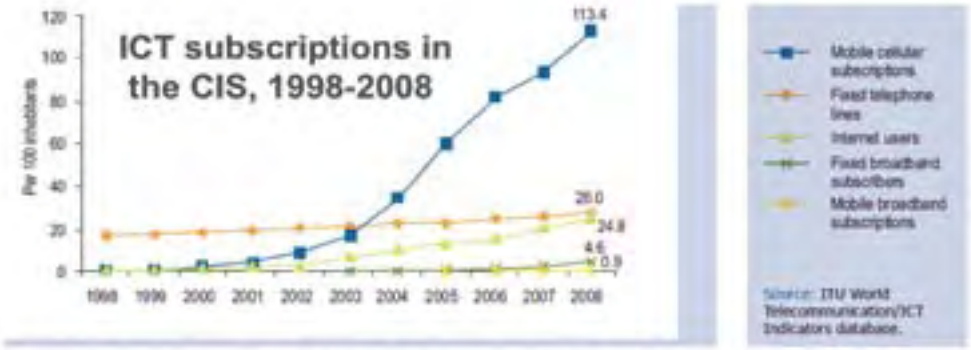
ECA 1+2: Mobile Applications

Assisting Mobile Applications Entrepreneurs to Start and Scale their Businesses

- Regional service hub for ECA
- Delivered in collaboration with Nokia, leveraging an existing organization in the host country
- Service offering to include:
  - Training and Testing facilities
  - Identification and piloting of potential applications
  - Incubation of start-ups
  - Business and financial services
  - Linkages with operators
- Entrepreneurs to be "recruited" through incubation network and mobile social networks

→ 10 new applications launched with viable business models by 2012

Why Mobile Applications?



- High growth market in a high growth sector
- Relatively low barriers to entry, esp for localization
- Strong possibilities for SME internationalization

ECA 3: Business Incubation

Business Incubators worldwide: ~4'000
ECA estimate: ~200-300

Country examples:

- **Romania: 20 incubators, started in 1992-1994, donor support**
- **Russia: 120 incubators (estimate), started in 1995 by donors, new government -supported program started in 2005**
- **Belarus: 8 incubators, started in 1998**
- **Azerbaijan: 1 incubator in planning stage, university based with donor support**

"Officially, there are 70 incubators operating in our country, but in practice there are 12." (incubator manager, ECA)

ECA Business Incubator success stories (1)

Kharpcheloproduct Ltd. Kharkov

- Incubatee of Kharkov Technologies Incubator, Ukraine.
- Honey and wax producer, honey and wax production instruments producer. Aircraft technologies engineer by profession.
- 2004: Four employees, focus on local market.
- Incubation impact *(incubatee perspective):* IT application and international marketing.
- 20 full and 40 seasonal employees in 2007.
- Sales increased 40-fold.
- Network of 100 local honey producers.

For more details on this and other success stories, go to www.idisc.net.

ECA Business Incubator success stories (2)

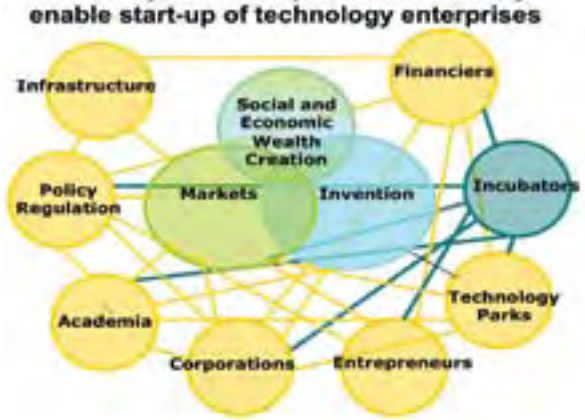
42Gradusi

- Incubatee of BII.GE Business Incubator Initiative Tbilisi (Georgia)
- Software development (B2B sector)
- Founded in 2008, employing 11 people in 2010.
- Clients in Georgia and Germany.
- Incubation impact *(incubatee perspective)*: Vision and strategy development, management, contacts to clients.

For more details on this and other success stories, go to www.idisc.net.

ECA 3a: Scaling Business Incubators and Strengthening Innovation Eco-Systems

Rationale:
- Increased impact can be achieved through larger scale
- An eco-system is required to effectively enable start-up of technology enterprises



Program:
- 3 countries from Eastern Europe, Caucasus and Central Asia
- 2-year program of technical assistance and grant financing

ECA 3b: Impact Assessment of Business Incubators

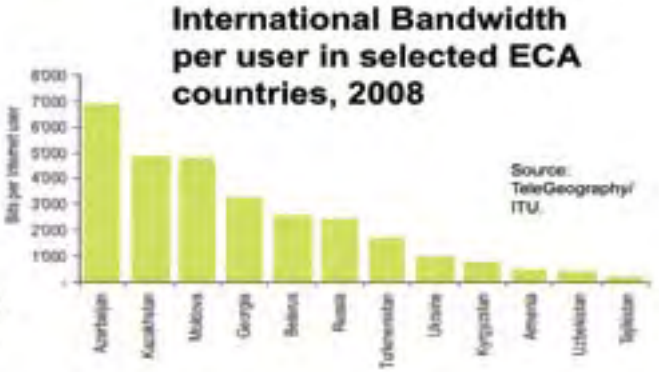
Key questions:

- What are the growth rates of incubated enterprises after they leave the incubator?
- What size have the enterprises reached in terms of sales and employees ?
- How many of them have an innovative product, service or business model?
- What is the effect of the incubated companies on the overall innovation eco-system and the competitiveness of a particular city, region or sector?
- Is the incubator sustainable? How is the it financed?
- What lessons can be derived?

ECA 4+5. Enhancing Competitiveness and providing capacity-building

The problem:

- **Generally low-levels of international**
- **internet bandwidth**
- **This results in high -priced broadband services and poor quality networks**
- **Network architectures reflect historical links**



Towards a solution:

- **Increase the level of competition and choice in international bandwidth**
- **Ensure cost savings are reflected in lower prices to end-users**
- **Research the connectivity requirements of SMEs**
- **Provide tailored capacity-building and awareness raising for regulators**

Enabling Value Added Agribusiness Entrepreneurship

Expanding Market Access for Technology SMEs

Why expand internationally?

- Domestic markets are often small and limit opportunities for growth
- International expansion extends the benefits of new technologies to a larger population

What hinders international expansion?

- Cost
- Lack of market linkages abroad
- Limited know-how on:
  - international market conditions,
  - business practices,
  - tools for internationalization,
  - regulatory requirements

3. Building Capacity in Business Incubation

eca bit

incubating innovation together

A state-of-the-art training program designed for business incubation stakeholders in developing countries and emerging economies

- **Business Incubation Models**
- **Planning an Incubator**
- **Marketing and Stakeholder Management**
- **Financial Aspects of an Incubator**
- **Facilitating Access to Finance for Incubatees**
- **Developing a Mentoring Program**
- **Monitoring and Evaluation for Business Incubators**
- **Business Incubation and Technology Commercialization**
- **Virtual Business Incubation**

The SME Internationalization Program

Leveraging infoDev's global network to help technology SMEs gain access to foreign markets

ECA Business Incubator success stories (3)

MHS*WARE*

- Incubatee of Timisoara Software Incubator, Romania.
- Computer system design, hardware and software development.
- Founded in 2004 by three university graduates.
- Incubation impact (incubatee perspective): *"One of the most important benefits is the possibility to work within a community of similar and like-minded start-up companies."*
- In 2010, serving clients in Romania, Italy, Switzerland, Canada, Germany.

For more details on this and other success stories, go to www.idisc.net.

ECA Business Incubator success stories (4)

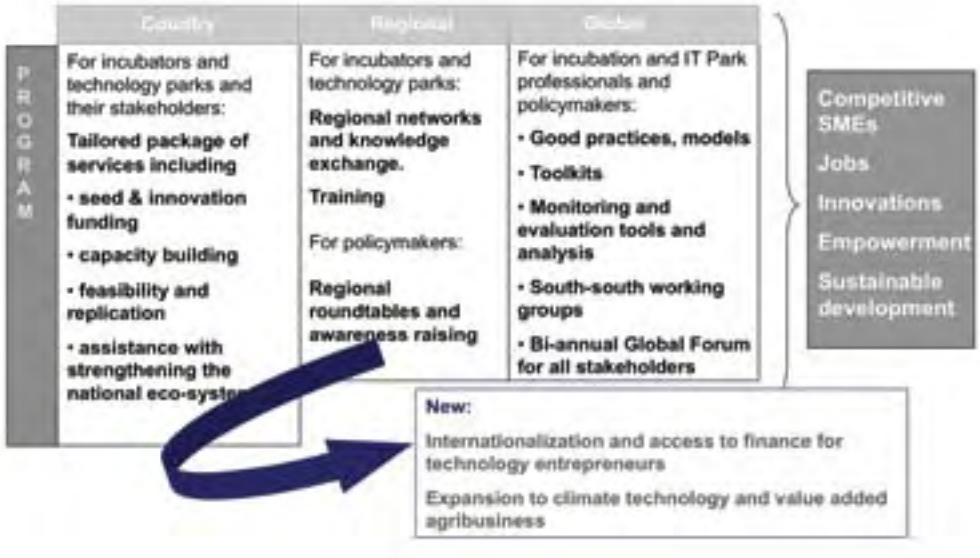
Incubation success stories (IV)

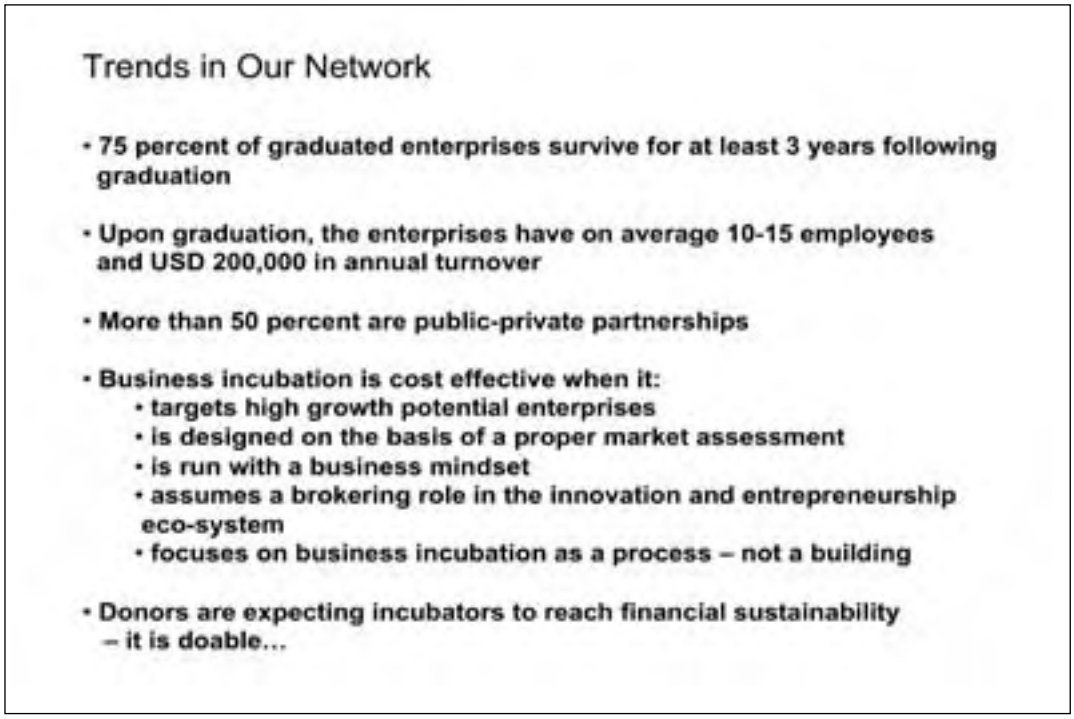
AdvertSMS

- Incubatee of YES Incubator Skopje, FY Macedonia
- Mobile application based marketing services.
- Founded in 2008 by a 21 years old student.
- From university business plan competition to market.
- Incubation impact *(incubatee perspective)*: Networking, knowledge and infrastructure.
- Reached break-even after one year of incubation.
- In 2010, market innovator and leader in the country.

For more details on this success story and on more success stories, please visit www.idisc.net.

infoDev's Program Offering




Trends in Our Network
• 75 percent of graduated enterprises survive for at least 3 years following graduation
• Upon graduation, the enterprises have on average 10-15 employees and USD 200,000 in annual turnover
• More than 50 percent are public-private partnerships
• Business incubation is cost effective when it:
• targets high growth potential enterprises
• is designed on the basis of a proper market assessment
• is run with a business mindset
• assumes a brokering role in the innovation and entrepreneurship eco-system
• focuses on business incubation as a process – not a building
• Donors are expecting incubators to reach financial sustainability – it is doable…

Plenary IV: Commercialization of Public R&D

The number of spinoff companies and technologies that have been patented and subsequently licensed as a result of public R&D in ECA is still very low by international standards. Similarly, the private sector allocates very little of its own R&D funding to research undertaken by public universities or research institutes in the region. By fostering the commercialization of public research, governments would increase the impact of innovation on economic growth.

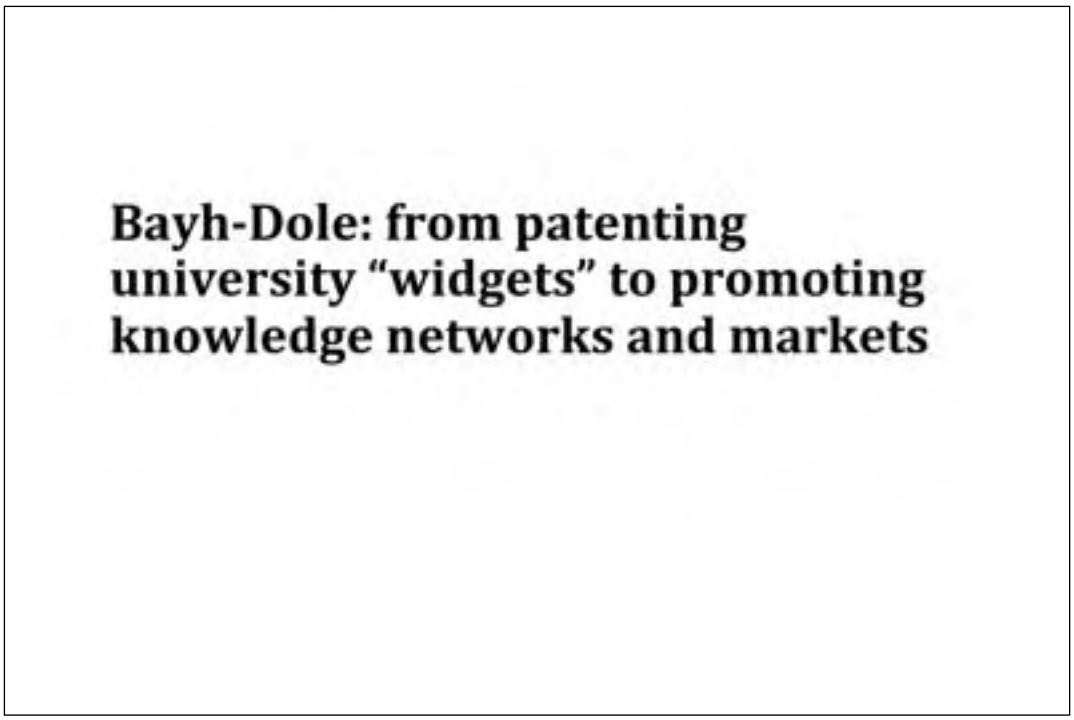
This plenary session discussed strategies fostering the commercialization of public research in ECA. Do ECA countries need a Bayh-Dole Act type of legislation? Why are technology transfer offices still rare in the region? Are countries over-investing in science parks? What is the role that venture capital should play? These were some of the questions addressed in the session.

Enabling Intellectual Property Regimes

Mario Cervantes, Senior Economist Science and Technology Policy Division, OECD
Mario.Cervantes@oecd.org

Mario Cervantes introduced the U.S. Bayh-Dole Act (University and Small Business Patent Procedures Act) and its concept of academic patenting.
The Bayh-Dole Act gives research institutions the right to patent and to commercially use the results of publicly funded research projects. The motivation for this act was to increase the accountability of publicly financed research and the commercial use of research results.

In the beginning, there were fears that academic patenting would lead to an erosion of basic research; however, most patents are issued in fundamental research very early in the development process. Overall, only very few patents generate meaningful revenue streams. The most important measures of success are the number of patents granted and the accompanying revenue streams.



Today's Themes

(1) Bayh-Dole or Academic Patenting as Policy

(2) Concerns about academic patenting

(3) Commercialisation of public R&D in a networked innovation model

(4) Towards knowledge networks and markets: collaborative IP mechanisms

(5) Implications for Policy

Academic Patenting as Policy

Rationale :

Revised social contract between science and society: greater calls for accountability

Market failures limit social –economic benefits from public research

Redistribute returns from public research back to society

Before Bayh-Dole

- **1920-1970s Ad hoc petition to patent by US universities**
- **1970s- Institutional agreements between Federal Agencies/Departments & Universities**
- **Informal channels for commercialising academic research**
- **Returns from public research accrue to private agents**

"Success" breeds emulation in OECD and beyond

- Reforms to funding rules in Germany, Japan, Korea
- Abolishment of professor's privilege in Denmark, Germany Austria, Norway
- Emulation of Bayh-Dole in emerging economies: Brazil, China, India, Malaysia and South Africa

Academic Patenting as Policy (con't)

- What is measure of success?
- Patents and Licenses
- Royalty Revenue
- New Products
- Spin-off companies
- High skill jobs
- Productivity and Growth

Evidence largely supportive, based on US/OECD experience

- Patent grants to universities and colleges increased sharply from 1988 to about 1999, when they peaked at just under 3,700 patents, and then fell to about 3,000 in 2008 (USPTO).
- Data from AUTM show that invention disclosures filed with university technology management offices grew from 13,700 in 2003 to 17,700 in 2007
- Patent applications filed by reporting universities and colleges increased from 7,200 in 2003 to almost 11,000 in 2007.
- US universities income from licensing increased from $200 million in 1991 to 1.6 billion US$ in 2005

- World-wide, public institutions owned 6% of all international patents filed under the PCT between 2003 and 2005.
- In Singapore, 24% of all PCT filings were owned either by the government or the higher education sector (OECD, based on PCT data)
- In Europe OECD, Ireland had the highest proportion of patenting by universities (9.5% in 2003-05), a notable increase over the mid-1990s when universities owned less than 3%.
- In Belgium, Israel, Spain, the United Kingdom and the United States, the higher education sector accounts for 6 to 9% of all PCT filings.

The problem with success

- Need markets for technology
- Need entrepreneurial academics (spin-offs)
- Need tacit knowledge
- Need institutional structures that give TTOs independence and credibility vis-a-vis academia and industry
- Need management and financial skills
- Need seed funding and links to venture funding
- Need luck - success is highly skewed
- Need to consider other output/outcome measures (e.g. networks, behavioural change)

Concerns about Academic Patenting

1. Concerns with patents in general - scope, quality, patent strategy (to exploit, to defend), fragmentation of IP rights (anti-commons)
2. Concerns about the mission of universities - shift from basic to applied, impact on academic freedom, conflicts of interest, costs and benefits
3. Concerns about academic patents in particular- will they aggravate the shift? Will they block research? Will they stifle other forms of knowledge transfer? Exclusive vs. non-exclusive licenses

Concerns valid, but jury is still out

- Anecdotal evidence of a growth in secrecy and limits on disclosure
- Universities are patenting inputs to research that were previously released in public domain
- BUT, there has not been a dramatic re -orientation from basic to applied
- Most academic licenses involve embryonic inventions, and require further R&D downstream
- Design and dissemination of policy safeguards can help

Examples of policy safeguards

- 1) NIH guidelines in 1999 encouraging grant recipients to widely disseminate NIH-Funded "Research Tools" so as to avoid blocking upstream research (e.g. in diagnostics) .
- The underlying principles of the NIH guidelines on research tools have been emulated by funding agencies in other countries
- 2) 2004 Rules of the California Institute of Regenerative Medicine (CIRM) requires that "non-profit grantees shall negotiate non-exclusive licenses on CIRM-funded inventions whenever possible"

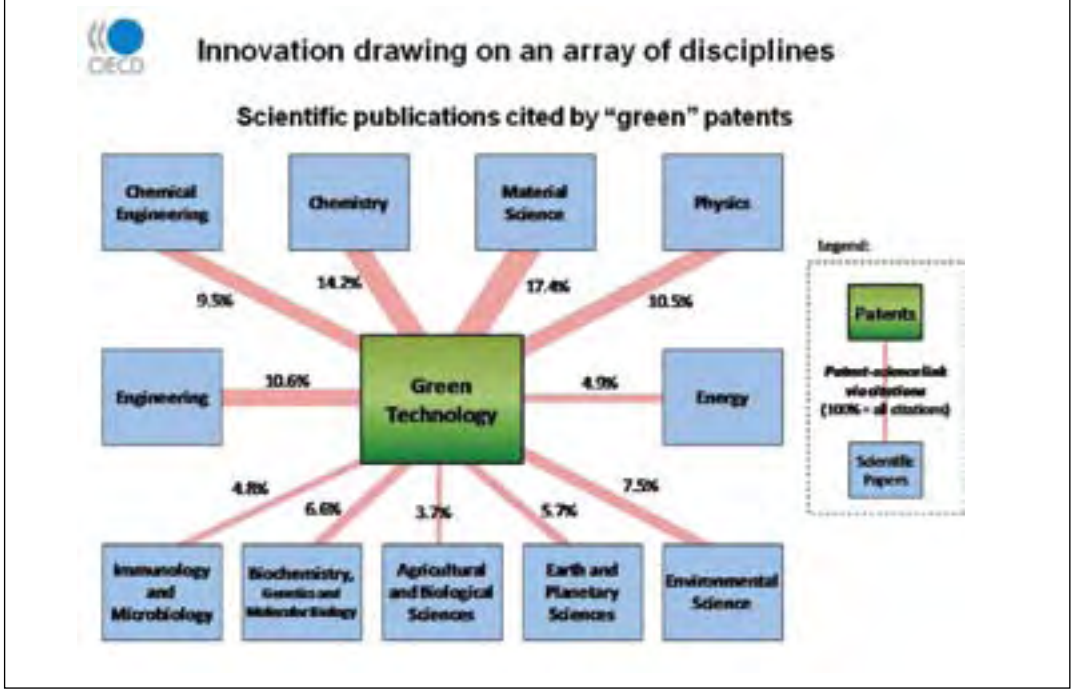
The challenge of the networked innovation model

Bayh-Dole enacted at a time of crises, when Japan was the main competitor to the US. Today it's a bigger game.

Bayh-Dole enacted when a supply-push tech-transfer model predominate; when a single or few patents on inventions could launch entire industries

Today, turning science into business is much more complex: a focus on challenge driven research, joint development

Need for speed, cost-sharing, and access to best talent and knowledge anywhere in the world = more openness!



Towards knowledge networks and markets: collaborative IP mechanisms

Networked innovation models requires greater sharing of knowledge and collaboration

Use of collaborative IP mechanisms such as Patent Pools, IP clearing houses, IP Sharing agreements :

- Create efficiencies in the exchange/trading of IP
- Facilitate research & development of technologies & products
- Create new commercial opportunities by pooling implementation technologies
- Clearing IP blocking positions
- Stimulate access to technology, research tools, etc.
- Reduce transaction costs and burden
- Can help address equity/development /global challenges
- Removing infringement uncertainty

Implications for policy makers

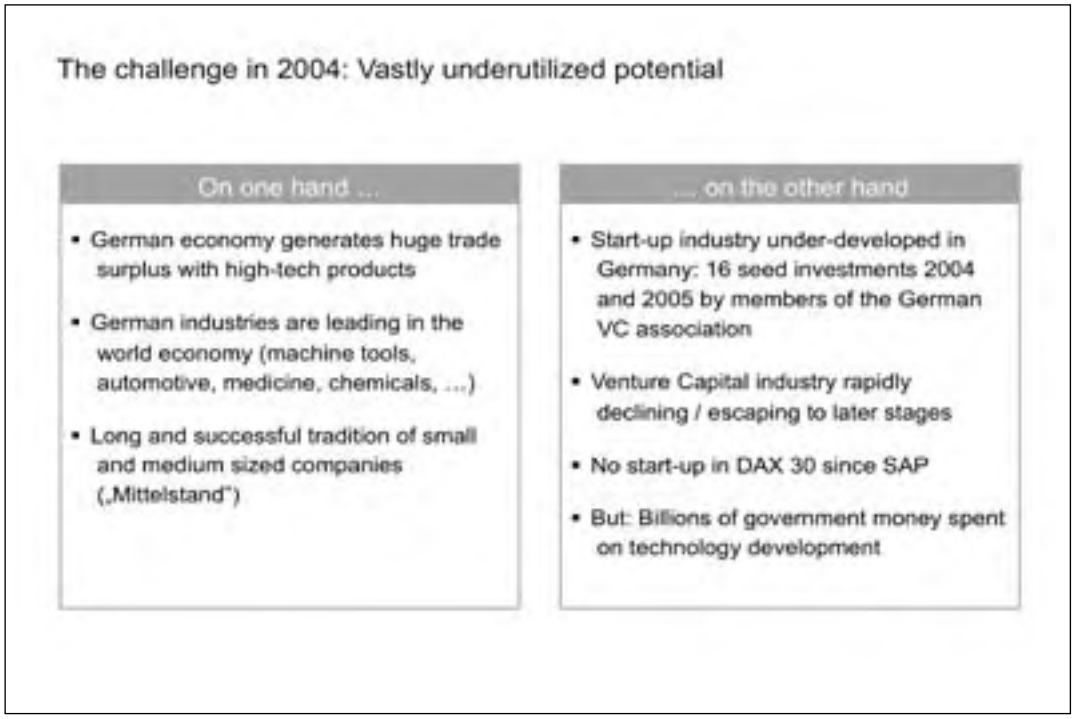
- Bayh-Dole type legislation - a building block in a larger framework for commercialisation of public R&D
- Patents need not be the default option, esp. in life sciences
- Role of collaborative IP mechanisms to foster networks /markets
- Universities and public research are "nodes" in broader networks of innovation
- Ensure incentives and practices compatible with a more open, networked model of innovation
- Funding agencies play a critical role
- Learn from others (experimentation in firms and non -profits foundations)
- Monitor and evaluate!

High-Tech Gründerfonds – Seed Investor in High-Tech Start-Ups: Success Factors of a Public-Private Partnership

Alexander Von Frankenberg, CEO, High-Tech Gründerfonds
a.frankenberg@high-tech-gruenderfonds.de

Alexander von Frankenberg introduced the German High-Tech Gründerfonds, a public-private venture capital funds aimed at the earliest stage of innovative companies, the so-called "seed" stage.

The main idea for the inception of the fund was to foster venture capital markets in Germany. Strategic success factors included complete independence from the public sector bodies and, as a result of this, the ability to use private sector incentive schemes. The inclusion of private capital, however small compared to the public holdings, secured access to a highly qualified network of companies and managers in the high-tech research-intensive sector.


The challenge in 2004: Vastly underutilized potential
On one hand ...
• German economy generates huge trade surplus with high-tech products
• German industries are leading in the world economy (machine tools, automotive, medicine, chemicals, ...)
• Long and successful tradition of small and medium sized companies („Mittelstand")
... on the other hand
• Start-up industry under-developed in Germany: 16 seed investments 2004 and 2005 by members of the German VC association
• Venture Capital industry rapidly declining / escaping to later stages
• No start-up in DAX 30 since SAP
• But: Billions of government money spent on technology development


High-Tech Gründerfonds: Key facts
• Founded: 2005
• Volume: 272 Mio. EUR
• Investors: German Government, KfW, BASF, Dt. Telekom, Siemens, Daimler, Robert Bosch, Carl Zeiss
• Planned duration: 6 years investment plus 7 years disinvestment period
• Focus: Innovative high-tech companies in the seed phase (start of operations < 12 months)
• Investment: 500.000 – 1.000.000 equity per company lead investor
• Support: Support through local coaches value add by High-Tech Gründerfonds team

Main results

Operations

- Closing of 186 investments[1] / 226 commitments
- Closing of 138 follow-on investments by third parties[2]
- External capital raised: >209 million Euro
- Thereof: 71% private capital
- Eight exits, five profitable

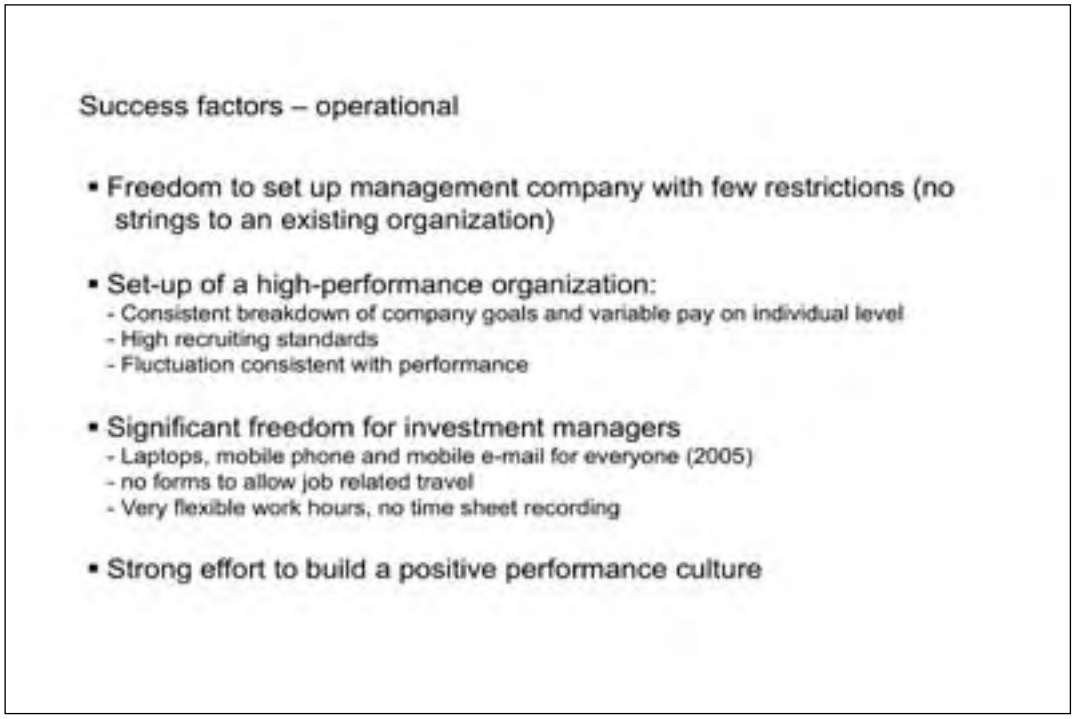
Other results

- Set-up of a high-number of working partnerships
- Impact on the early stage market on several levels (market share of 50% in the Germany seed market)
- Number of "produced" paper millionaires: 89
- Set-up of high performance organization
- Fun

1) 4 in 2005, 52 in 2006, 40 in 2007, 42 in 2008, 34 in 2009, 14 in 2010
2) Various public and private investors

Success factors – strategic and conceptual

- Involvement of government representatives, experts with background of public financing and private investors
- Private contribution to the fund (17m, 6,3%)
- Strong understanding of the venture capital business model
- Systematic inclusion of relevant know-how (e.g. mistakes from the past)
- „Independent" management company that can focus on goals („no political influence")
- Right timing at the bottom of the market

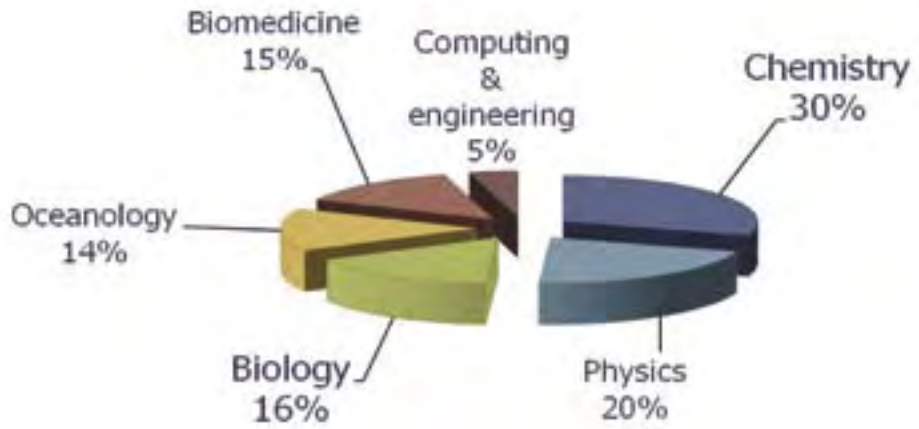

Success factors – operational
• Freedom to set up management company with few restrictions (no strings to an existing organization)
• Set-up of a high-performance organization:
- Consistent breakdown of company goals and variable pay on individual level
- High recruiting standards
- Fluctuation consistent with performance
• Significant freedom for investment managers
- Laptops, mobile phone and mobile e-mail for everyone (2005)
- no forms to allow job related travel
- Very flexible work hours, no time sheet recording
• Strong effort to build a positive performance culture

Current Status and Future Prospects of Technology Transfer at the Croatian Ruđer Bošković Institute

Danica Ramljak, Director General, Rudjer Boskovic Institute, Croatia
Danica.Ramljak@irb.hr

Danica Ramljak introduced the Rudjer Boskovic Institute, the preeminent Croatian research institution, and its newly founded transfer company Rudjer Innovations Ltd. Rudjer Innovations Ltd. was founded in 2007. Its main aim is the commercial exploitation of discoveries and inventions from Rudjer`s researchers. Furthermore, the institute supports IPR awareness among its researchers and supports resulting commercialization projects and spin-offs.

IRB OVERVIEW BY BRANCHES



TOTAL = 867 EMPLOYEES

542 RESEARCH STAFF (344 WITH PhD) +
325 SUPPORT AND TECHNICAL STAFF

198	YOUNG RESEARCHERS
34	YOUNG RESEARCHERS WITH PhD
118	SENIOR RESEARCH ASSOCIATES
95	RESEARCH ASSOCIATES
98	SENIOR RESEARCHERS

MISSION

High quality basic research

Strong involvement in higher education

Leading contribution to the growth of the national economy

VISION

EU Centre of scientific excellence

Delivering knowledge and values to industry, government and academic institutions

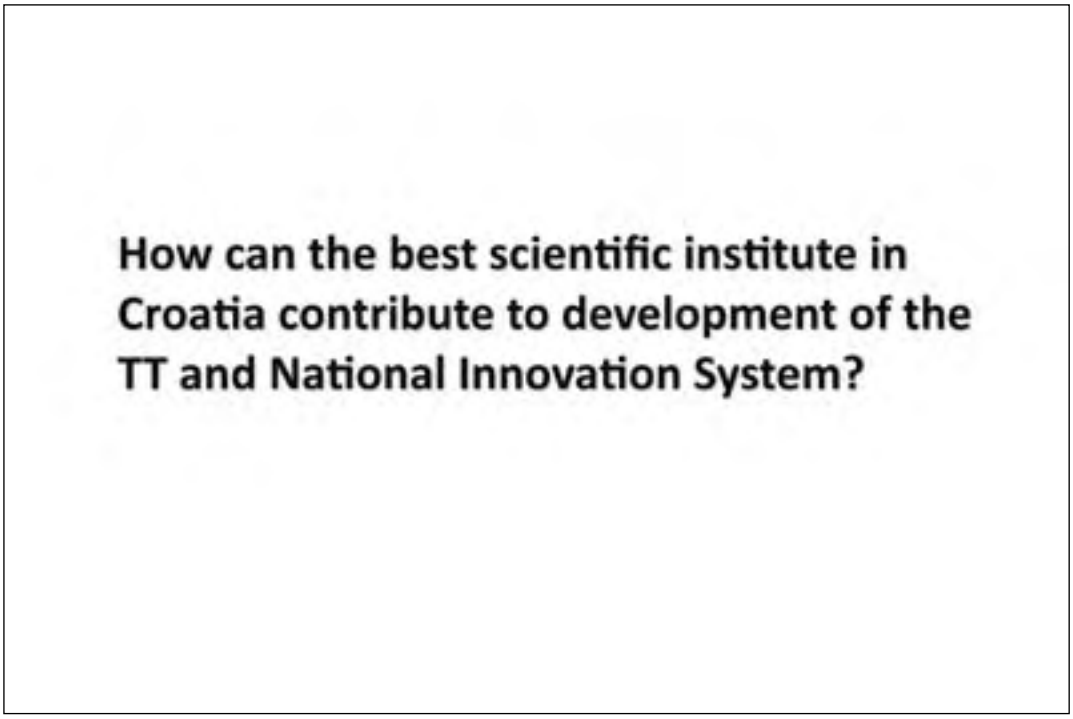
SCIENTIFIC PUBLICATIONS

RBI scientists - 6% of the total no. of scientists in Croatia

☑ 32 % of all Croatian articles cited in Current Content

CC Papers: 2004 - 2009

2004	2005	2006	2007	2008	2009
364	389	356	408	406	440


How can the best scientific institute in Croatia contribute to development of the TT and National Innovation System?


THERE IS NO EFFICIENT TT and INNOVATION SYSTEM WITHOUT:
• Strong basic research
• Strong applied research
• Strong cooperation between scientific community, academia and industry
• Strong education system
• Strong leadership
• STRONG NATIONAL GOVERNMENT COMMITMENT

Intellectual Property and Commercialization

- RBI's Agency founded in 2007
- specialized in commercialization of innovations and technology transfer
- links science and technology with economy and industry.

Portfolio: more than 80 innovations and scientific projects in various fields with commercial potential but primarily in chemistry, medicine, biology, physics and informatics

- 7 employees,
- more than 80 projects (32 outside RBI),
- 32 patent applications
- 7 license agreements, 1 patent granted and 5 spin-offs

Spin off companies

Ruđer Innovations

- Commercialization of innovations and technology transfer

Ruđer Medikol Cyclotrone

- Development and production of radionuclides

Ruđer Medikol Diagnostics

- Breast and other genetic hereditary diagnostics

Initium Futuri

- Innovative ICT technologies

BioZyne (in formation)

- Biotech company for R&D in the life sciences (cancer drugs)

IF IN NUMBERS

- investment: 154kEUR
- Ownership: R:51%, inventors (4):49%
- Profit sharing: R:51%, inventors (4):49%

Year	2007	2008	Sep 2009	Expected in 2009	2010	2011
Staff	4	5	5	5	6	6
Projects	3	4	5	5	6	7
Licences, business contr.	0	1	2	2	4	5
Revenue (EUR)	0	26631,72	38125,56	cca. 72000	100	150

IF PROJECT PORTFOLIO

- **SmartECG** - Mobile Heartwork analysis and alarming system
- **Vergilius** – Navigation for visually impaired
- **Eduforia** – eLearning and collaboration software
- **ePortfelj** – Web 2.0 personal investment portfolio manager
- **Custom software and consulting services** – one big BPR (Business Process Reengineering) project in progress

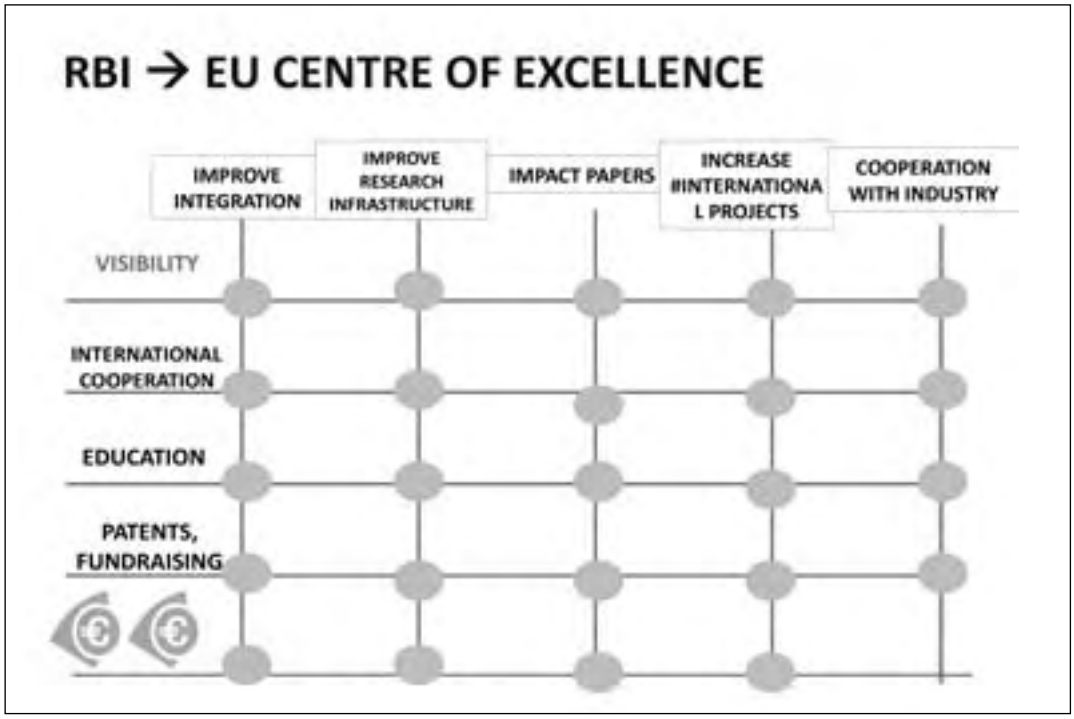
RMD IN NUMBERS

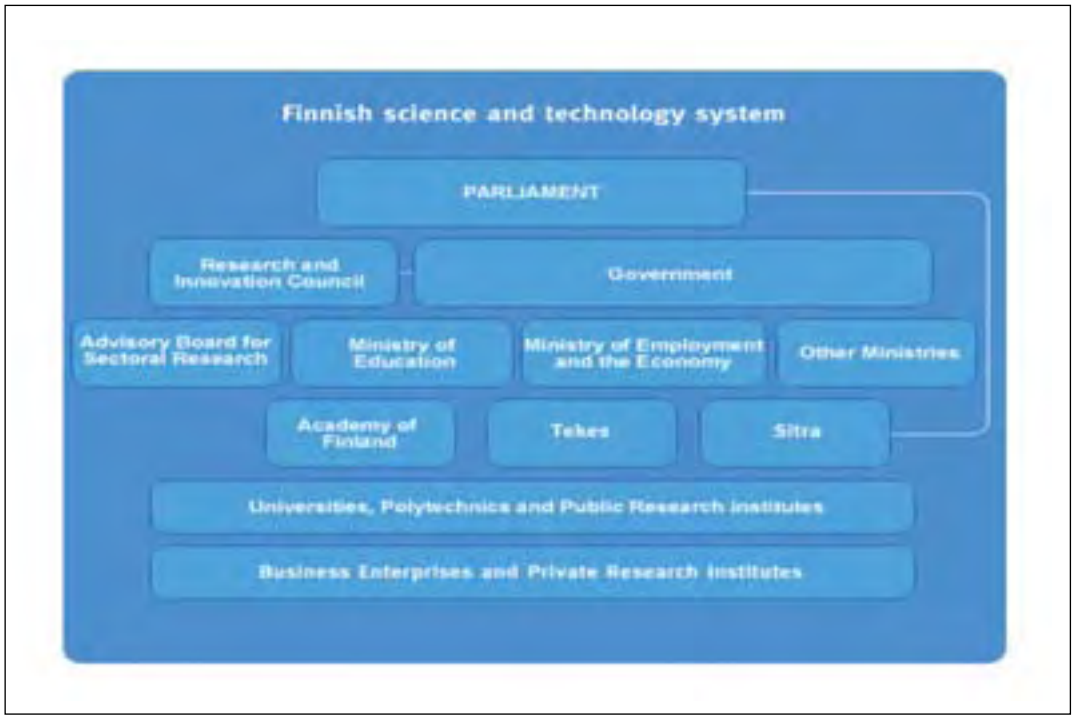
- Investment: 50kEUR
- Ownership: RI 50%, Medikol 50%
- Profit sharing: RI 80%,Medikol 20%

Year	2008	Sep 2009
Staff	1	1
Projects/diagnoses?	0	2
Revenue (k EUR)	0	2
Costs (k EUR)	19	9

Do research and TT at IRB need improvement?

YES !


RBI → EU CENTRE OF EXCELLENCE
IMPROVE INTEGRATION
IMPROVE RESEARCH INFRASTRUCTURE
IMPACT PAPERS
INCREASE #INTERNATIONAL PROJECTS
COOPERATION WITH INDUSTRY
VISIBILITY
INTERNATIONAL COOPERATION
EDUCATION
PATENTS, FUNDRAISING


Finnish science and technology system
PARLIAMENT
Research and Innovation Council
Government
Advisory Board for Sectoral Research
Ministry of Education
Ministry of Employment and the Economy
Other Ministries
Academy of Finland
Tekes
Sitra
Universities, Polytechnics and Public Research institutes
Business Enterprises and Private Research institutes

Plenary V: Skills (Not Just Diplomas) Are Needed in an Innovative Economy: Young Voices Perspective – From Theory to Reality

How are ECA's education systems responding to the demands of the knowledge economy? Are graduates in ECA prepared to engage in the innovation practices that can ultimately ensure the region's competitiveness?

In this session, the regional flagship study on skills was presented by the authors, and a "talk-show" discussion involving students from across the region brought a new focus to the analytics of the study. Through the discussion, the panel of students provided a fresh "reality check" based on their own experiences in their school-to-work transition. During a lively discussion, the audience had the opportunity to ask questions to the study authors or any of the members of the youth panel.

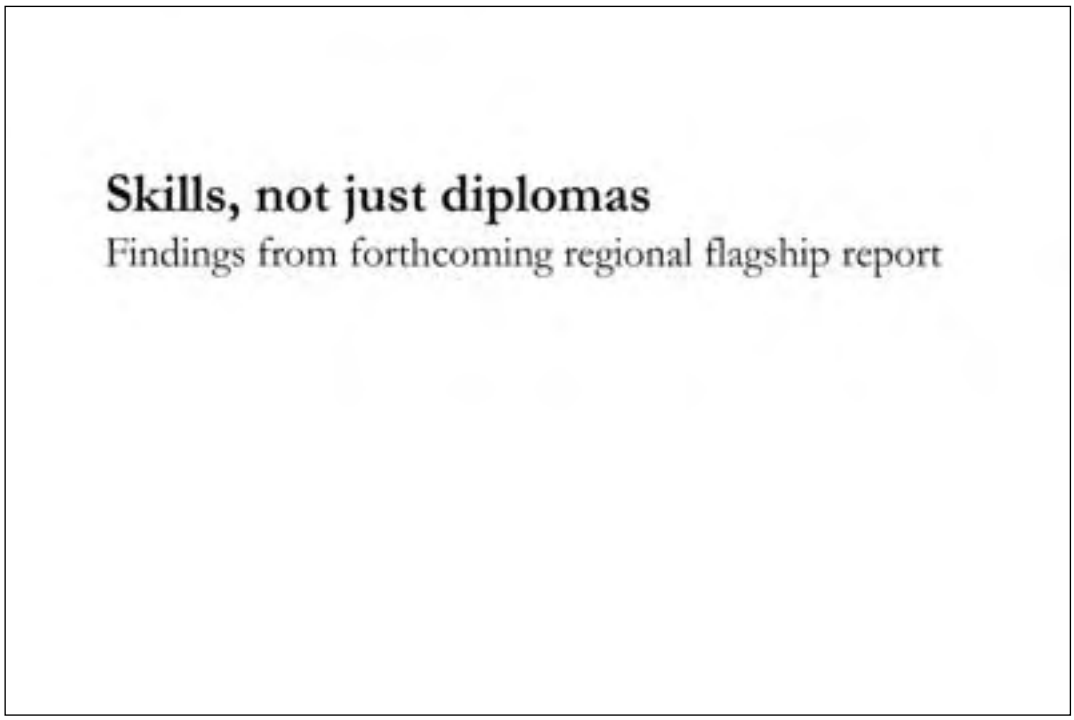
Presentation of the Forthcoming World Bank Regional Report on Skills

Lars Sondergaard, Senior Economist, Human Development Department (ECSHD), World Bank
lsondergaard@worldbank.org

Mamta Murthi, Education Sector Manager, ECSHD, World Bank
Mmurthi@worldbank.org

Mamta Murthi and Lars Sondergaard presented first results of the forthcoming "World Bank Report on Skills" (published in the late summer of 2010).
The authors pointed out that economic welfare depends more and more on innovation, which, in turn, depends on complex and "applicable skills" like the interactive usage of tools and the ability to work autonomously as well as in heterogeneous groups. However, old education sys-tems are made for the needs of the "old economy", thus not teaching the "right skills". So what can countries do to improve education?

According to Sondergaard, countries need to "turn the lights on"; implementing quality assurance mechanisms on international models and increasing the accountability for results will make it possible to use financing as an instrument for enhancing the quality of education systems. Thus, the steering process involves a balancing act among three instruments: financing, accountability and autonomy concerning the application of funds. Focusing on excellence before reaching a certain quality level in general, however, would be unhealthy.

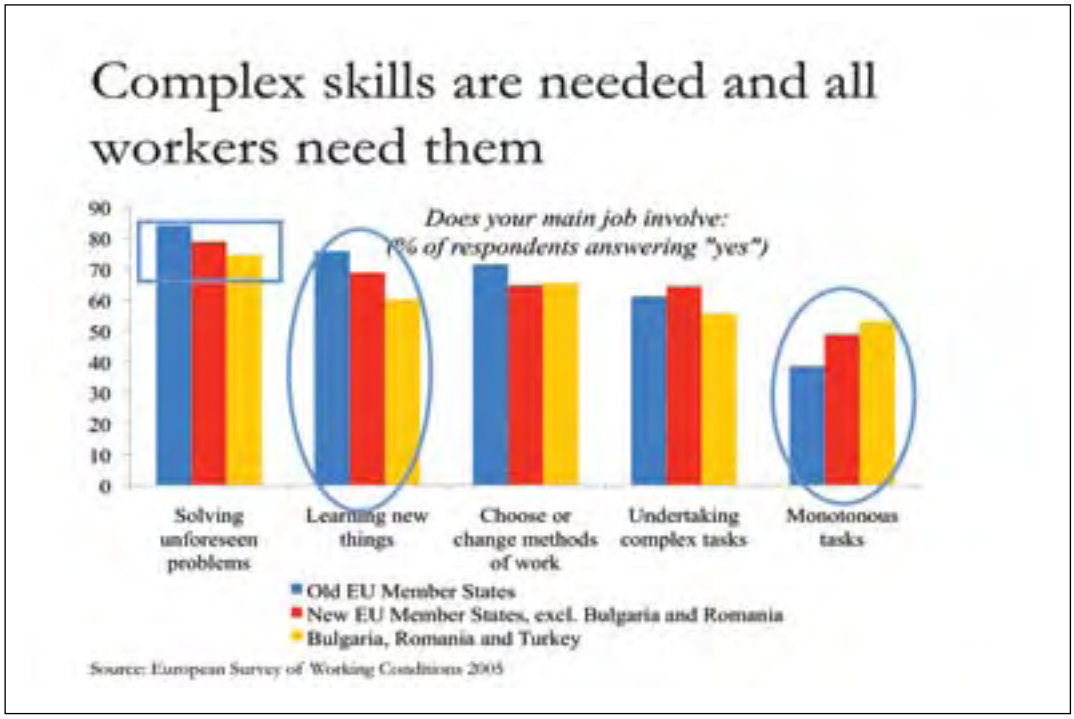


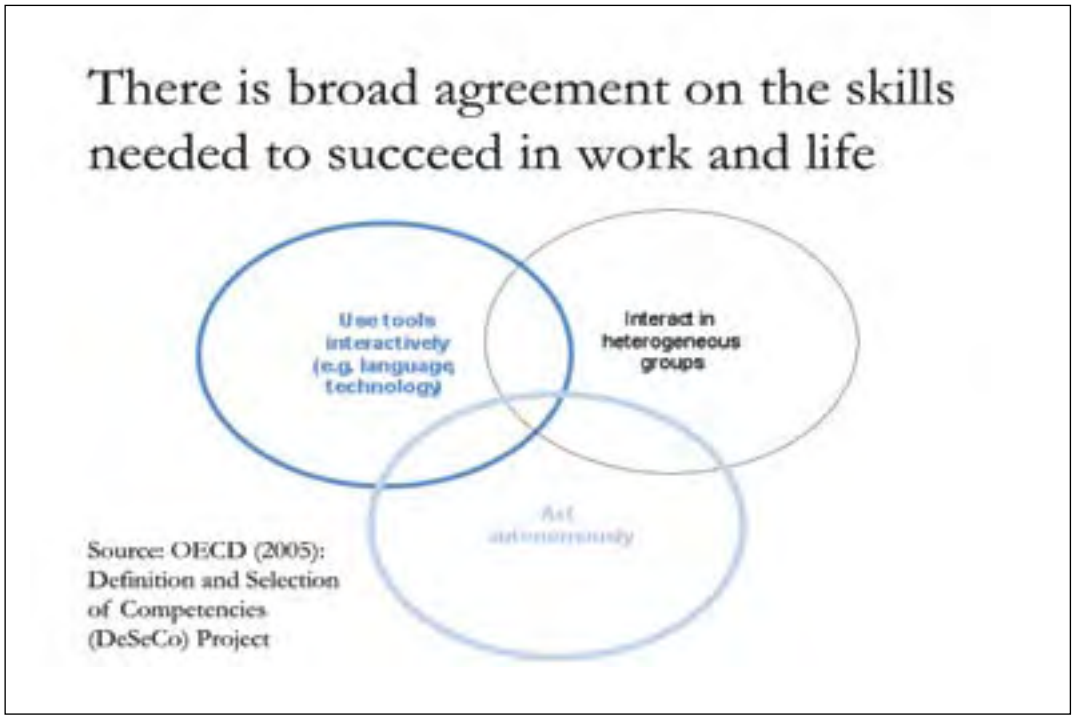
Innovation requires skills

- Why a session on skills?
  - Future growth will depend more on improving competitiveness and labor productivity
  - This requires innovation
  - Innovation requires skills

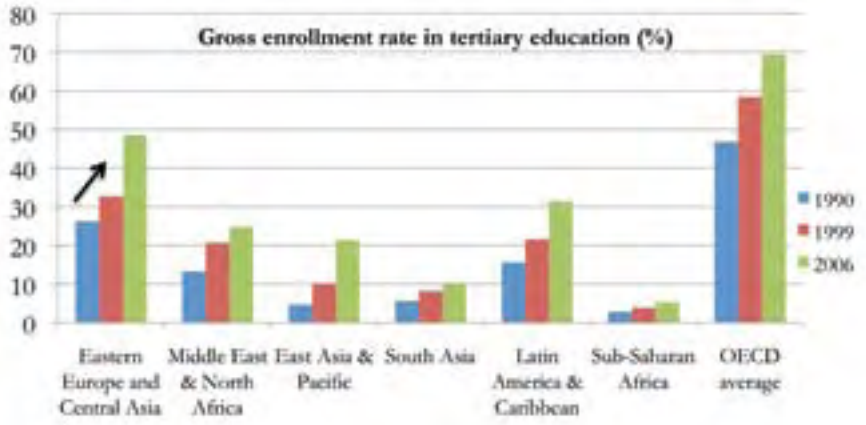
Messages and structure of presentation

- What skills are we talking about?
  - Broad set of skills: cognitive, social and life skills
- How well are education and training systems doing?
  - Expanding access
  - Providing skills for all
- What can countries do to improve?
  - Provide better information on quality of education
  - Relying more on incentives to steer sector


Complex skills are needed and all workers need them
Does your main job involve:
(% of respondents answering "yes")
90
80
70
60
50
40
30
20
10
0
Solving unforeseen problems
Learning new things
Choose or change methods of work
Undertaking complex tasks
Monotonous tasks
Old EU Member States
New EU Member States, excl. Bulgaria and Romania
Bulgaria, Romania and Turkey
Source: European Survey of Working Conditions 2005

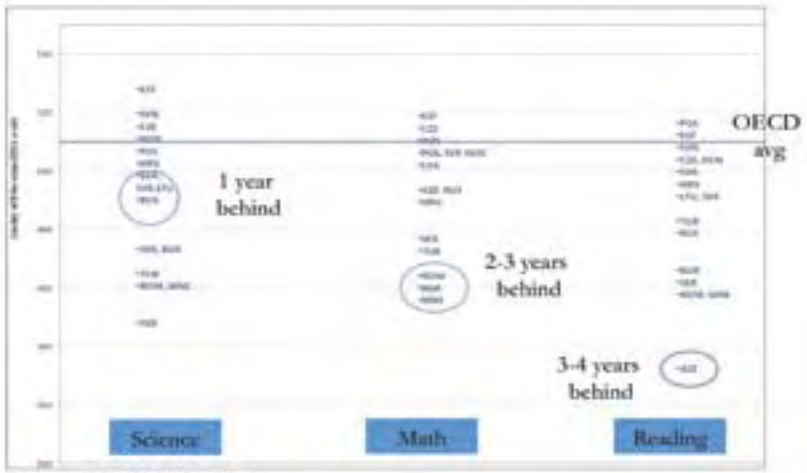

There is broad agreement on the skills needed to succeed in work and life
Use tools interactively (e.g. language, technology)
Interact in heterogeneous groups
Act autonomously
Source: OECD (2005): Definition and Selection of Competencies (DeSeCo) Project

Good news: more diplomas are being issued

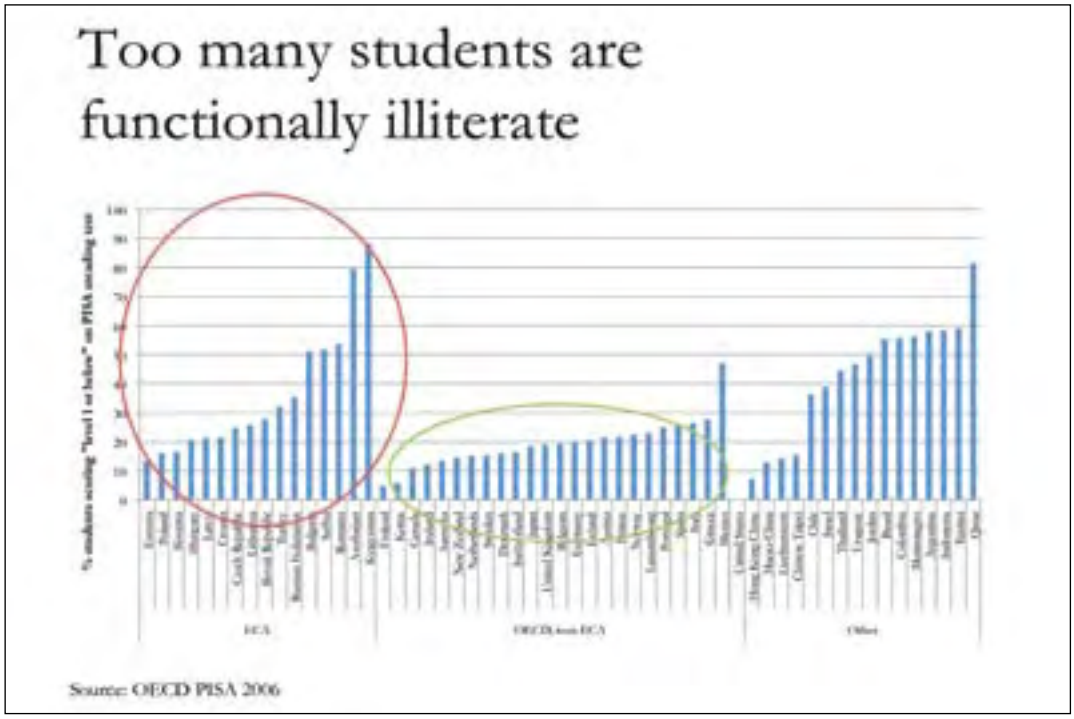


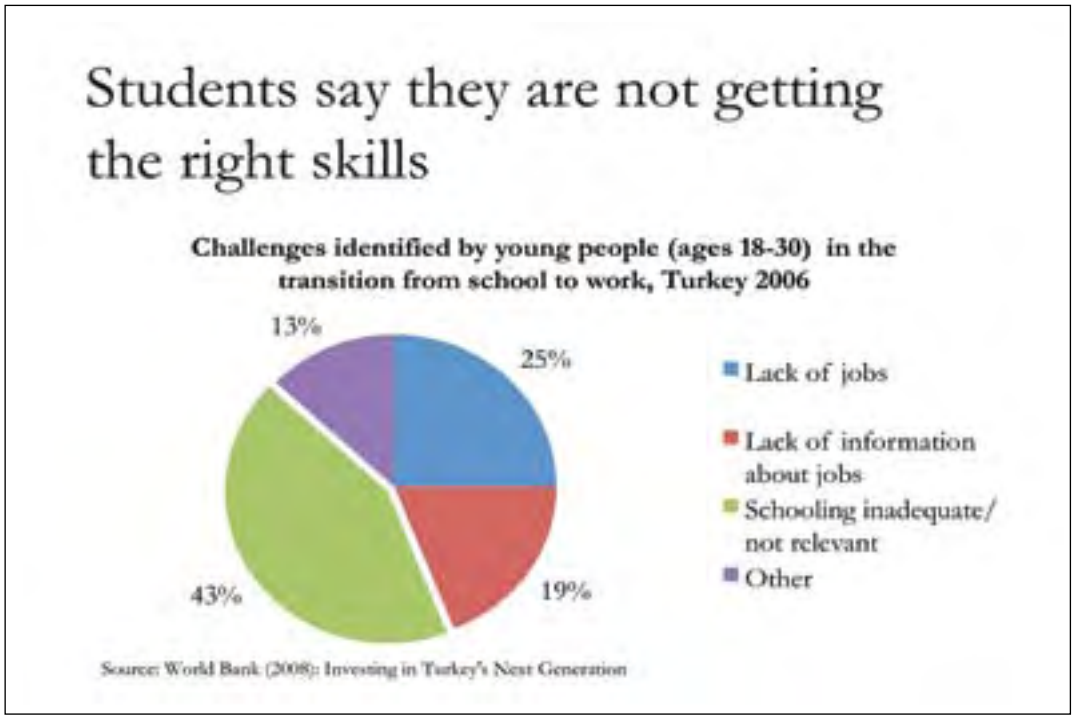
Source: World Bank Edstat

But quality indicators suggests ECA countries are falling behind

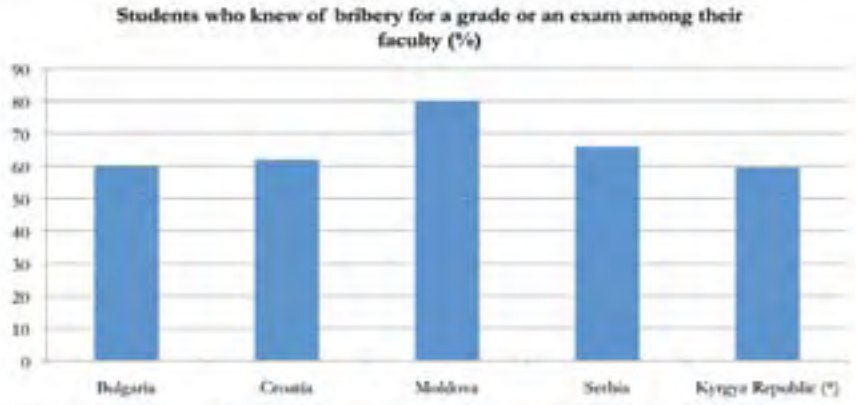


Source: OECD PISA 2006


Too many students are functionally illiterate
Source: OECD PISA 2006


Students say they are not getting the right skills
Challenges identified by young people (ages 18-30) in the transition from school to work, Turkey 2006
13%
25%
43%
19%
Lack of jobs
Lack of information about jobs
Schooling inadequate/ not relevant
Other
Source: World Bank (2008): Investing in Turkey's Next Generation

Fraud, corruption and unethical behavior – widespread?



(*) Data for Kyrgyz Republic is a bound on a slightly different question: students were asked if they had "personal experiences with corruption and bribery in their university".

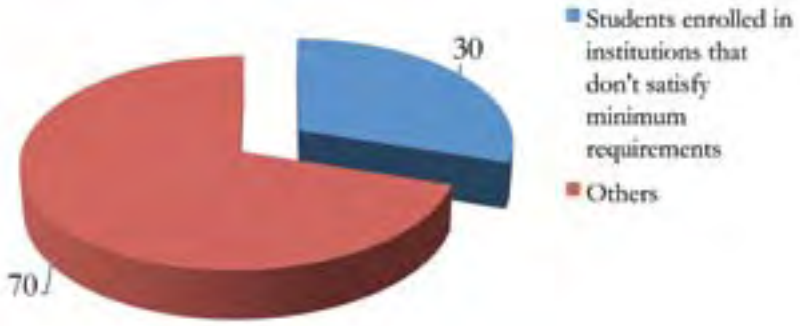
Source: Heyneman, Stephen P. Kathryn H. Anderson, and Nazym Nuraliyeva (2007)

Employers agree: they listed "skills" as a main constraint before the crisis

Workers' skills had become a constraint on firm expansion by 2008. (percent of firms considering factor a 'major' or 'very severe' constraint) Source: Turmoil at Twenty, World Bank, 2009

When agencies start flexing their muscles, the news hasn't been good

% of students enrolled in higher education institutions that did not satisfy minimum quality standards (estimate, Georgia 2004)



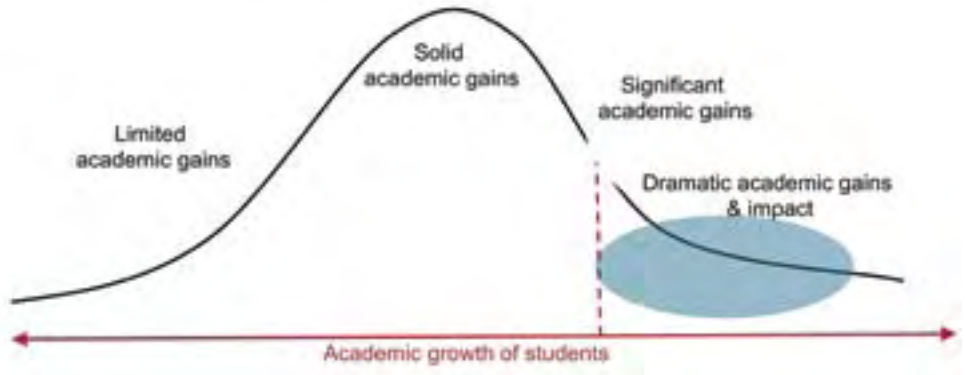
Let's face it: we know very little about who succeeds and who fails

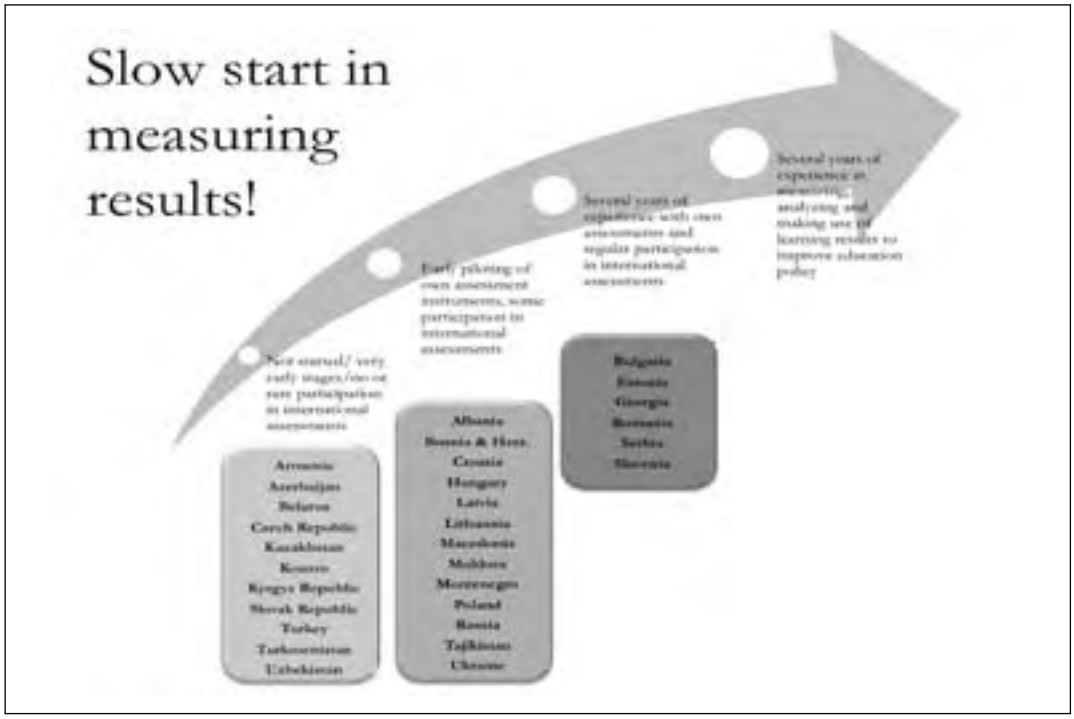
- Unhealthy tendency to focus on excellence, rather than the quality achieved by all
- What do we really know about the quality of tertiary education when it comes to creating skills?
  - Which institutions are truly great at imparting skills to their students?
- What happens to students after they graduate?

Example of important unknown

- There are around 35 HE institutions teaching economics in Kiev: 20 private and 15 public
  - Student's perspective: which institution does a better job at teaching me the skills I need to succeed? (selectivity ≠ high quality teaching)
  - Employer's perspective: which students outside of the prestigious institutions have skills?
  - Policy maker's perspective: which institution is performing well? Which institution need sanctions/rewards/support?

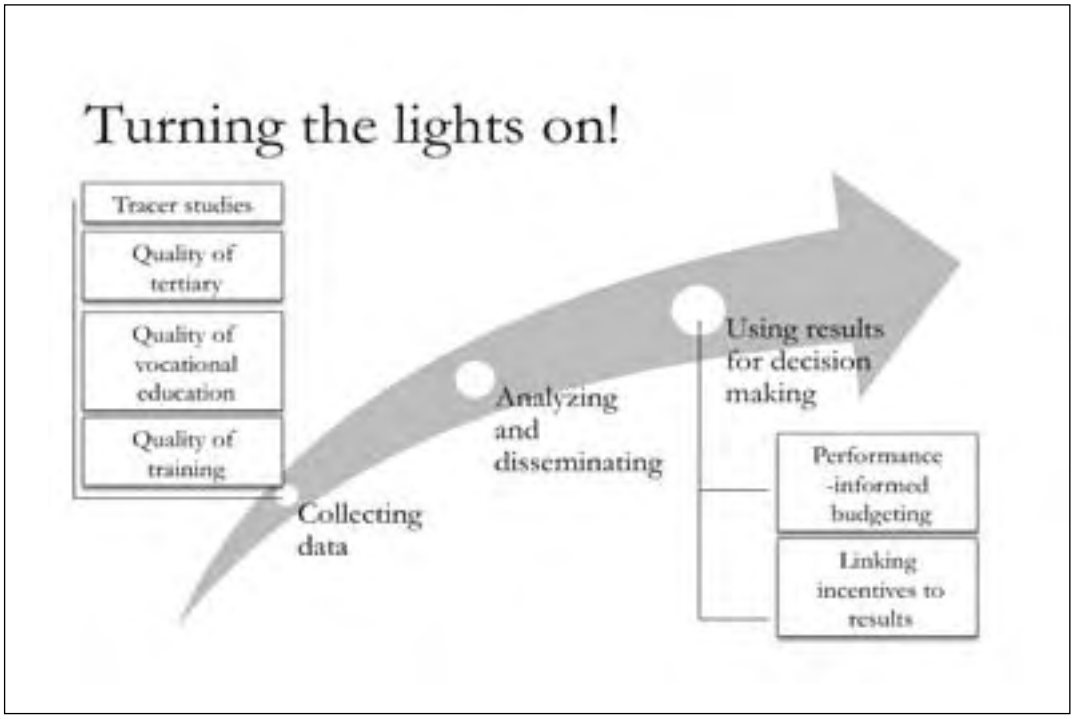
The distribution matters!





What can policy makers do better?

- Turn the lights on!
  - Measure, analyze, disseminate and use results for policy making
- Different role for central policy makers: less micro-management and more focus on steering



Use information on results to steer

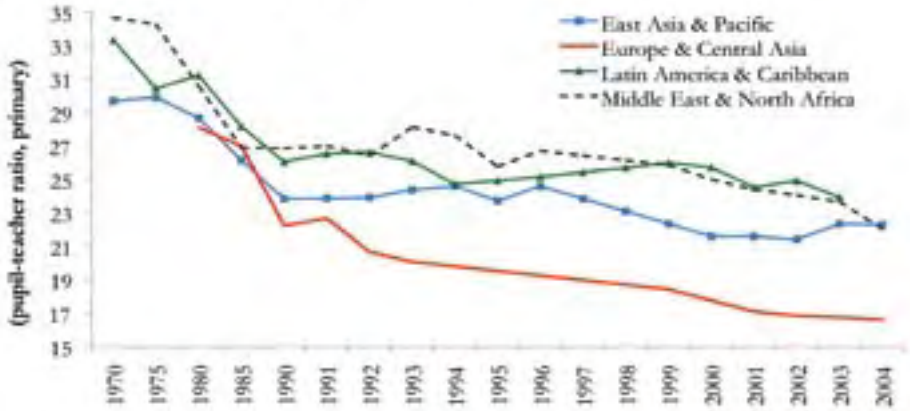
- More autonomy in exchange for results
- Use financing as an instrument: tie resources to results
- Increasing accountability for results

Steering involves a balancing act among three instruments

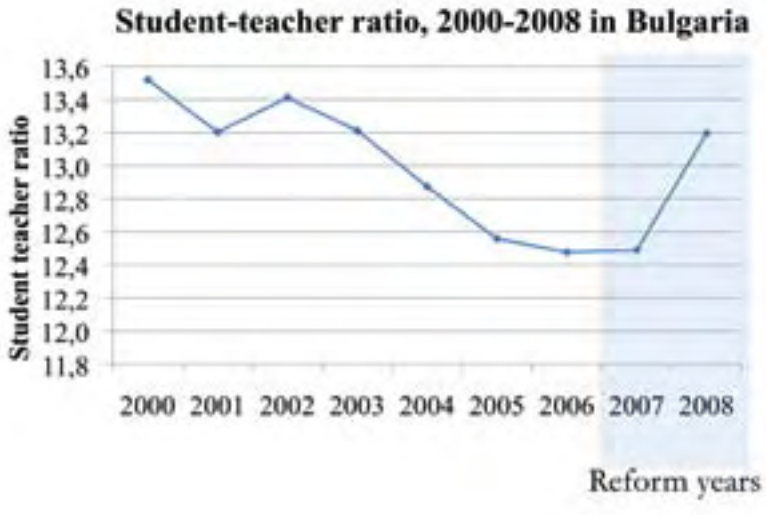
Don't rely on only one way to strengthen accountability

- Accountability through accreditation and quality assurance… but this takes time!
- Accountability through information and transparency: rankings, performance tables, tracer studies
- Accountability through partnerships with civil society and students

Better use of sector's resources is needed to pay for better quality



The right policies can have a big impact



Young Voices Perspective – From Theory to Reality
Moderated by Alberto Rodriguez, Country Sector Coordinator, Central Europe and the Baltic Countries, ECSHD, World Bank
arodriguez@worldbank.org

The "young voices" Marina Sheryaeva, Mihajlo Babin, Guglielmo Briscese and Victor Valkov gave a very personal view on the education systems they experienced, with special regard to their school-to-work transition. Their complaints "proved" what Murthi and Sondergaard had already stated: In many cases, education systems do not meet the needs of a modern economy, teaching the "wrong" skills or at least failing to impart applicable knowledge. According to the "young voices", the teaching personal is one of the main problems: With teachers unmotivated to teach (with poor didactical skills), very much specialized and unwilling to join further education, students are not prepared for the needs of the labor market. Additionally, experience of bribable teaching staff has discouraged many students because money seems to be more important than real achievements.

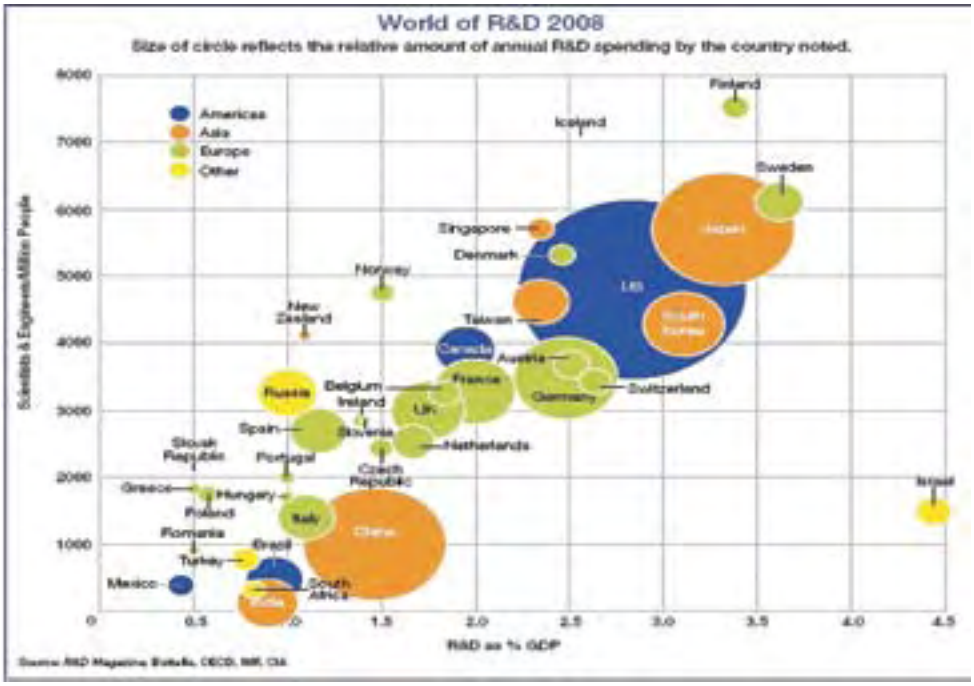
Plenary VI: From Lisbon to Europe 2020 –
Higher Education and Research as Drivers of Competitiveness

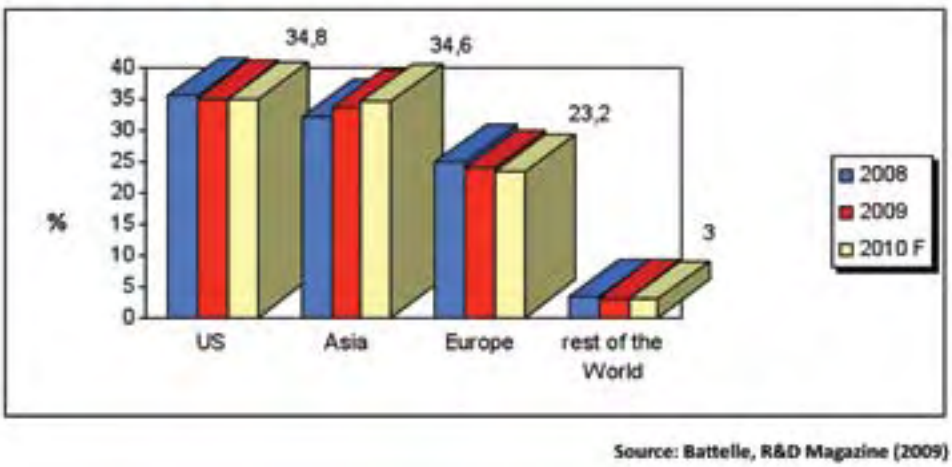
The EU recently launched its revamped competitiveness strategy, Europe 2020. The lead coordinator of the Europe 2020 Strategy team joined the KEF IX to discuss what the transition from the former Lisbon Agenda to the new Europe 2020 Strategy means in the European context, especially with regard to restoring the Union's economic vitality and improving its global competitiveness. The plenary stimulated a timely discussion on what this may imply on a country policy level, including a discussion of the associated output-oriented country-level targets that had to be agreed on during the June 2010 European Council meeting. The session also facilitated a discussion on key reform areas contributing to the Strategy's European-level objectives, specifically on employment and skills, as well as on research and development and innovation. The experiences of two new EU member states were highlighted in this context, i.e. Lithuania and Poland.

From the Lisbon Agenda to EU 2020

Gerrit Gerard de Graaf, Head of Unit for Coordination of the Europe 2020 Strategy, European Commission Secretariat-General
gerrit.de-graaf@ec.europe.eu

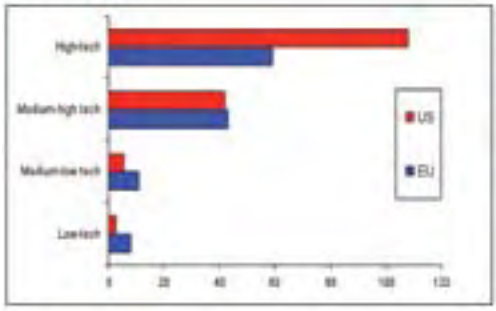
Gerrit de Graaf gave a brief introduction to the "Europe 2020" Strategy, its central targets and the current circumstances under which the strategy was developed (i.e. the economic crisis and three lessons learned with regard to existing patterns in politics and economics). In conclusion, De Graaf outlined three measures in order to overcome the lacking implementation process of the Lisbon Strategy, i.e. clear targets, development of flagships, and enhanced monitoring and evaluation of the progress.


World of R&D 2008
Size of circle reflects the relative amount of annual R&D spending by the country noted.
Americas
Asia
Europe
Other
Scientists & Engineers/Million People
R&D as % GDP
Finland
Iceland
Sweden
Singapore
Denmark
Norway
New Zealand
Taiwan
Canada
Austria
Switzerland
Germany
France
Belgium
Ireland
UK
Russia
Spain
Slovenia
Netherlands
Slovak Republic
Portugal
Czech Republic
Greece
Hungary
Poland
Italy
China
Romania
Brazil
Turkey
Mexico
South Africa
India
Israel

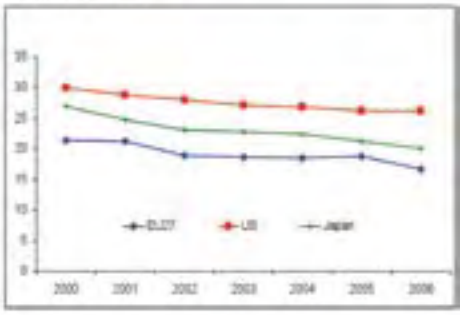

Europe's share of global R&D spending is falling
%
34,8
34,6
23,2
3
US
Asia
Europe
rest of the World
2008
2009
2010 F
Source: Battelle, R&D Magazine (2009)

Nurturing high-tech, high-growth sectors

R&D spending (€ bn) and industrial structure (2008)



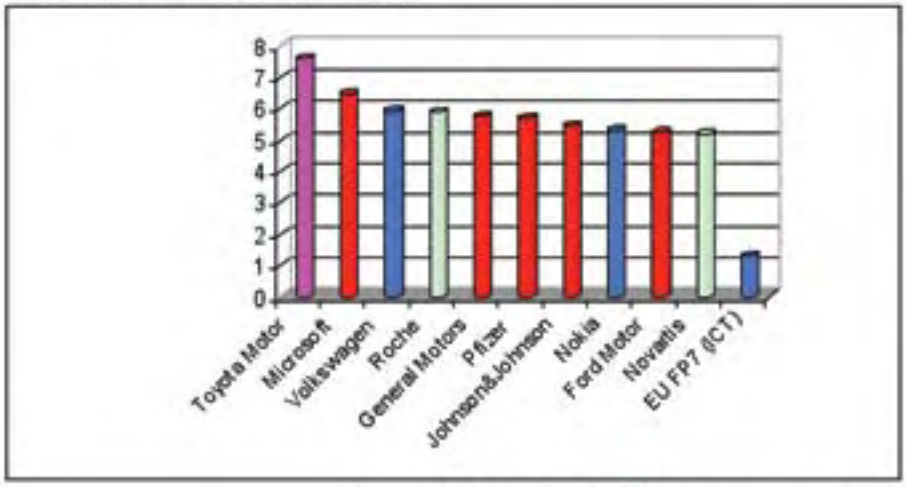
Share of high-tech exports (% of total exports)



The EU is lagging behind major partners as regards the 'smartness' of its economy and high competitive pressure arises from developed and emerging economies.

Matching the pace of competition

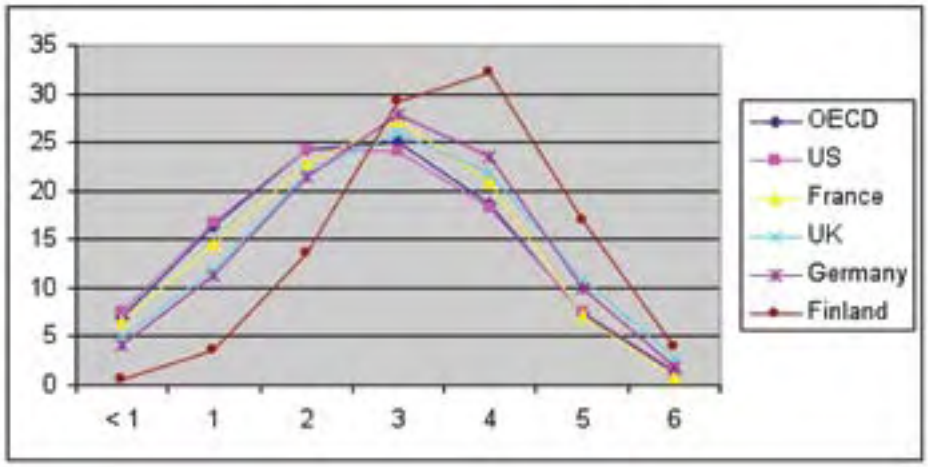
Investment in R&D in 2008 (billions €)



(Source: 2009 EU Industrial R&D Investment scoreboard)

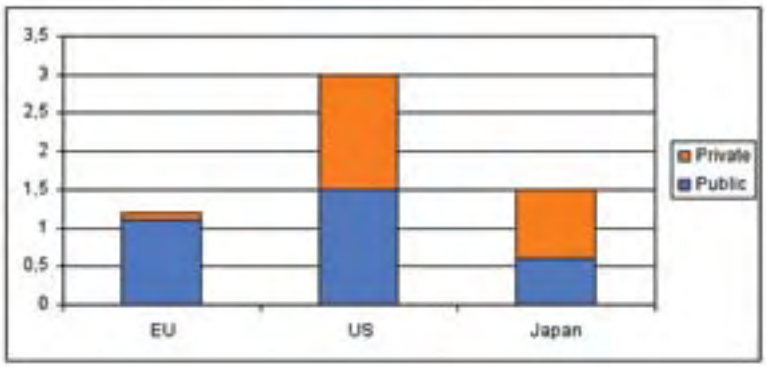
Taking up the global fight for knowledge

Percentage of students at each proficiency level on the science scale (PISA 2006 – OECD)



Investing in our students and universities

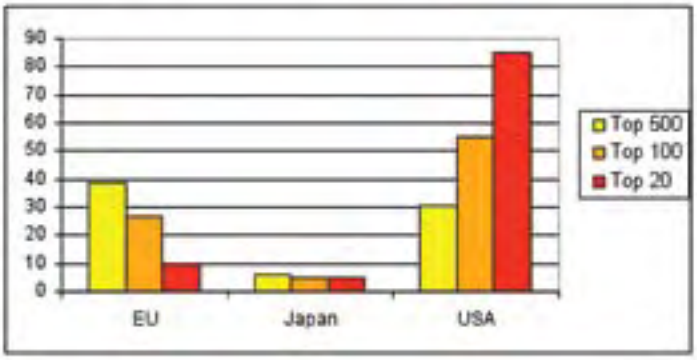
Expenditure on tertiary education (% GDP)



Total spending on tertiary education in the EU (as a % of GDP) is less than half the US level, mainly as a result of lower private spending in Europe.

Taking up the global fight for knowledge

Share in the top institutions of the 2009 Shanghai list

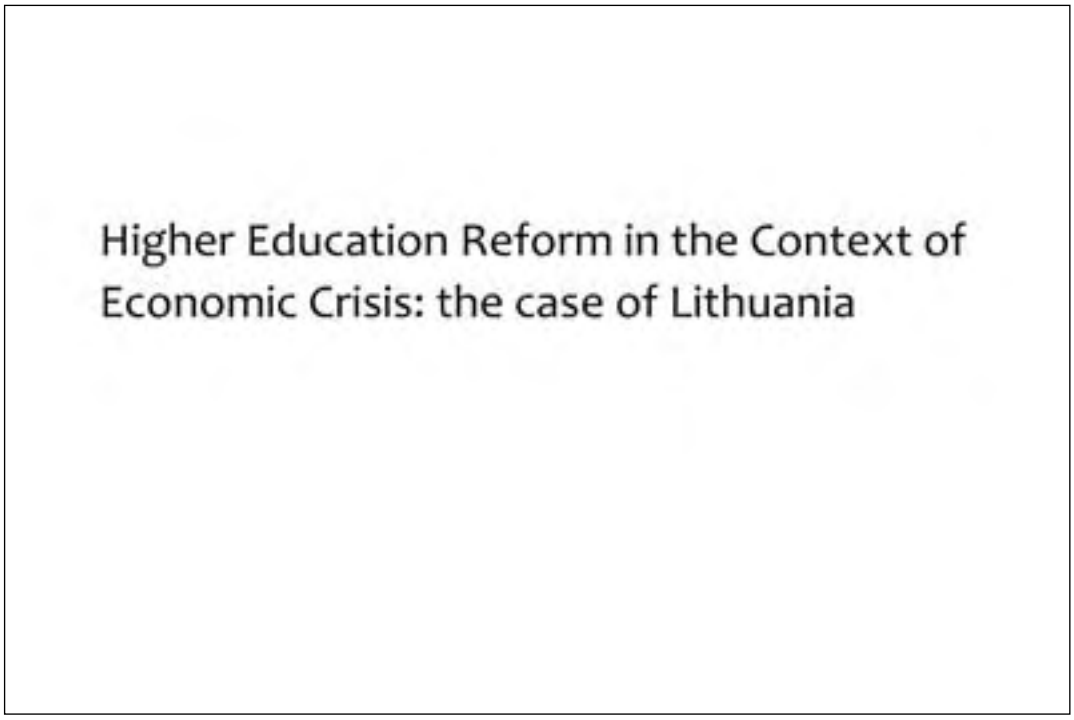


While the EU has 40% of the universities in the top 500 of the Shanghai ranking, the top end is clearly dominated by the US (17 of the top 20 institutions are located in the US).

Higher Education Reform in the Context of Economic Crisis: The Case of Lithuania

Gintaras Steponavicius, Minister of Education and Science, Lithuania
Ministras@smm.lt

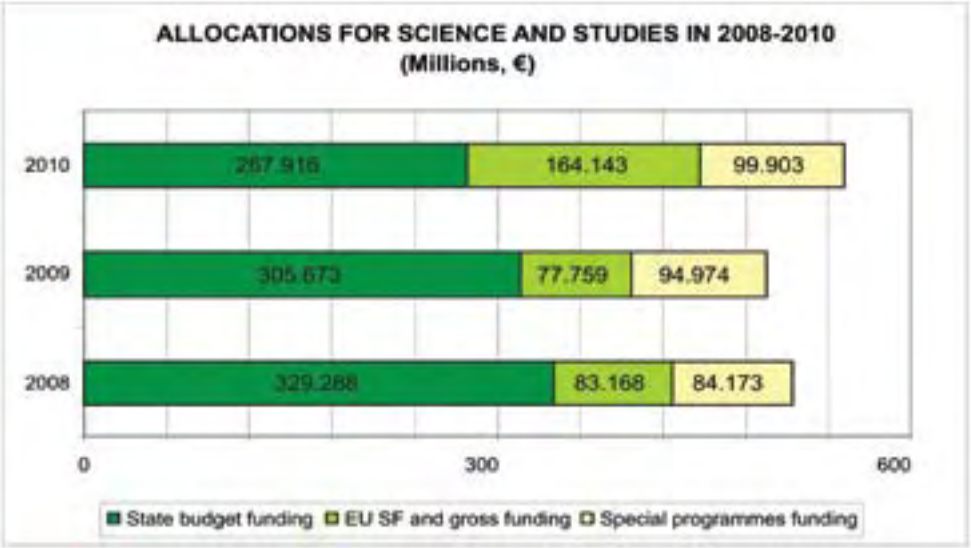
Mr. Steponavicius presented the recent structural reforms in the higher education and science sectors of Lithuania, which aim at raising both the number of graduates and their qualification in terms of developing competencies corresponding to the needs of the labor market. In this context, among other measures, higher degrees of autonomy were conceded to higher education institutions, and student vouchers for financial support of the best students were introduced.



Starting point 2009

- 12 000 researchers, 6000 with doctoral degrees
- 300 - 400 new doctoral degrees each year
- 200 000 students (60 000 in the colleges)
- 23 university (8 private), 17 state and 18 university research institutes, 23 colleges
- Investments in R&D - 0,8 % of GDP
- 6,7 % researchers in business and industry

Financing

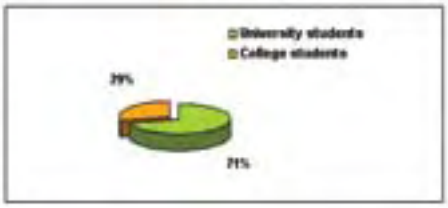


HE system in Lithuania

HE institutions (HEIs) & students	1999/2000	2007/2008	2008/2009	**2009/2010**
Universities + Colleges	16	49	49	**46**
Total number of students	84 345	204 432	210 400	Approx. **200 000**

Number of HEIs in 2009/2010:	State	Private
Universities	15	8
Colleges	13	10

Distribution of students by the type of HEI's in 2009:



Reform of Higher education and research system

New Law on Higher Education and Research **30-04-2009:**

Competitive funding of HE (Students' vouchers)

- Programme based competitive research funding
- Institutional reform of research institutes
- Institutional reform of universities and colleges
- External institutional evaluation
- Intellectual rights protection
- Science Council reformed in to Research Council
- Agency of Research, Innovation and Technologies established

Major goals of the higher education reform

Quality. To create conditions and incentives necessary for the substantial improvement in HE quality

Accessibility. Favorable conditions to all who want and are able to pursue studies

Competitiveness. State funding for the best students and researchers.

Efficient use of resources. Impetus for the rising prosperity of the country

State funding for bachelor studies is given to students, not institutions

State funding for bachelor studies is provided in the form of student vouchers to the best entrants applying to HEI's:

- Entrants choose freely an educational institution – whether it's a public or a private one
- State funds allocated for vouchers are divided into 11 areas of studies to meet the demand for different kinds of specialists

11 areas of studies: humanitarian, social, physical, biomedical, technology sciences, artistic and visual arts. Law, business, pedagogy and medicine are separated out of these as separate areas.

First results of the new funding mechanism

- ❑ State funding was given to the best university and college students. Since 2009 public funding is also available for part-time studies.
- ❑ The number of students in vocational schools have increased responding better labour market needs.
- ❑ A number of the weakest study programs didn't attract enough students and have to be renewed or closed.
- ❑ Smaller HEI's started think about consolidation, first HEIs announced their wish to merge.
- ❑ Next to public funding universities were able to attract even more private funding from the self-financed students.

Quality reason – competition among HEI's
(First year results)

Proportion of student vouchers by type of HE institutions in 2009:

- Universities: state – 98 %, private – 2 %;
- Colleges: state – 91 %, private – 9 %.

25829 students were enrolled in state and private Universities for I cycle studies in 2009. Out of this number:

45 % studies fully covered by the state (vouchers),

55 % pays full price themselves.

15961 students were enrolled in state and private Colleges in 2009. Out of this number:

58 % studies fully covered by the state (vouchers),

42 % pays full price themselves.

Increasing accessibility

To ensure real accessibility a state loan system for students has been transformed and expanded. Since 2009 students can get state-supported loans from the private commercial institutions (banks) to cover their:

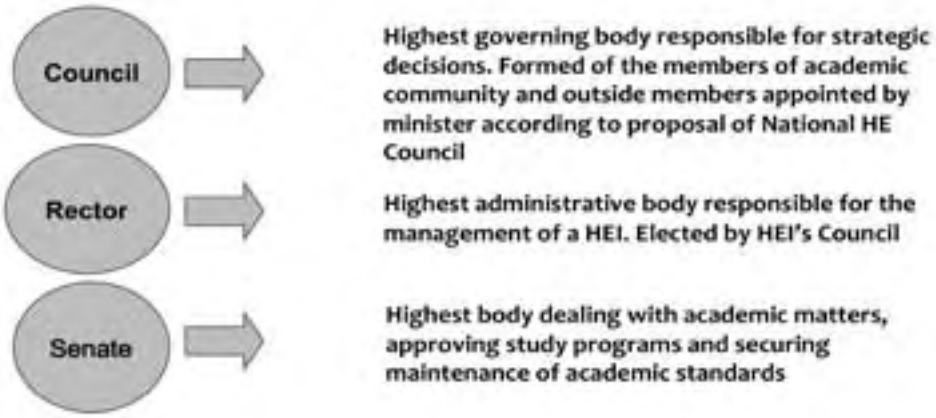
- study costs,
- living expenses,
- part time studies abroad under international agreements.

Objectives:

- The opportunity to provide students with loans has increased 6 times;
- The loans are provided by 4 banks, the competition of which enables students to choose the bank offering the lowest interest rate;
- During the studies period the government will compensate interest rate higher than 5 percent for loans taken to cover their study costs;
- Loans can be taken in national currency (litas) as well as in euro's
- Repayment of the loans related with the student's income rates (income contingent).

Social scholarships are also available to students with low socio-economical background, disable and orphans. This type of scholarship and amount in money is regulated by the state.

New management and accountability



Essential enlargement of autonomy

- New legal status – from a budgetary entity into a public entity – more freedom for decision making
- Right to own and manage property entrusted by the state

The main focus in 2010

- **Attention to the students enrolled in science and technology studies – more state funded places comparing with other fields of studies**
- **Attention to the pedagogical studies** – less number of state funded places, more state allocations per one study place, additional scholarships
- **Renewal of the I cycle study programmes**
- **Development of joint study programmes to increase the internationalization of HE**
- **Development of the tools for internal quality assurance systems in HEI's**
- **To adapt study infrastructure for the needs of disable students**
- **Encourage development of practical skills and entrepreneurship of students**

10 % of Structural Fund support – for HE, research and innovation

EU structural funds – attention to R&D infrastructure, human resources and environment

- R&D Programme for Cooperation Between Public R&D and Business Sectors - Integrated Research, HE and Business Centers (Valleys)
- Common National Integrated Programme – 12 national integrated Programmes in R&D knowledge susceptive economical sectors
- Researchers Career Programme - professional improvement of researchers at all stages of their career

Concentration of Lithuanian R&D potential

- Reorganization of Institutes' Network
- National Science Programmes

Stimulation of innovation

Investments into:
R&D infrastructure, human resources and environment

Structural Funds Programmes 2007-2013

- R&D Programme for Cooperation Between Public R&D and Business Sectors (218,06 mil. €)
- Common National Integrated Programme (97,43 mil. €)
- Researchers Career Programme (182,5 mil. €)
- National Higher Education Programme (221,28 mil. €)

Integrated Research, HE and Business Centers (Valleys)

5 Valleys Programmes started in 2009

Focus on priority fields

- Biotechnology and biomedicine;
- Materials science, physical and chemical technologies;
- Natural resources and agricultural;
- Engineering and IT.

Stimulus for R&D commercialization

Recommendations for Lithuanian science and studies institutions regarding the rights arising from the results of intellectual activities, approved by the order of the Minister of Education and Science December 1, 2009

Recommendations – a consulting guide, setting the guidelines for Lithuanian science and studies institutions on the rights, arising from the results of intellectual activities, and their use, disposal and management.

Consolidation of State Research Institutions' Network

Before consolidation:

17 State Research Institutes
18 University Research Institutes
10 State Research Institutions

After consolidation:

5 Centers of Science and
6 State Research Institutes
(17 Institutes was integrated into universities)

Actions

- Open international tender for the selection of the Valley Monitoring Group experts announced
- Funding Contracts of the Projects of National Integrated Programs will be signed
- Regulation basis for management of open-access centers
- Legal basis of the Science and Technology Parks renewed

By 2020 Lithuania targets **2% R&D intensity (0,8% in 2009):**

- In the period of the financial crisis, the budget allocations to the higher education and science sector were reduced less than in average to the public sector in total.
- Since 2009, government expenditure on R&D has been increased due to SF allocations.
- New fiscal incentives for R&D: improved financial accounting in business sector is expected;
- Due to reform: new incentives for research and higher education institutions to commercialize R&D results and attract investments from business sector.
- Reformed research and higher education system and renewed infrastructure: foreign investment should increase.

Challenges

- Successful implementation of the HE and research reform
- Successful implementation of EU structural funds programmes
- Strengthening of studies, science and business integration for growth of Lithuania's economy
- Globalization and internationalization
- Preparedness for New EU financial programming period for 2014-2020

Operationalizing the EU's Competitiveness Agenda: Case Study Poland

Nina Arnhold, Senior Education Specialist, ECSHD, World Bank
narnhold@worldbank.org

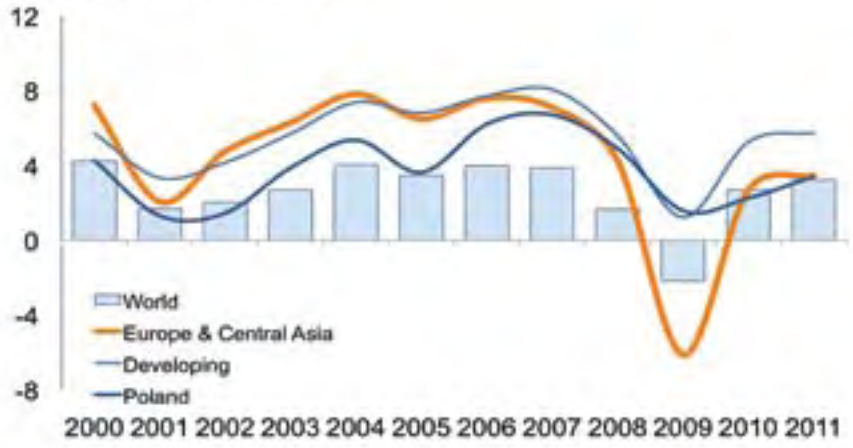
Natasha Kapil, Private Sector Development Specialist, ECSPF, World Bank
nkapil@worldbank.org

Nina Arnhold and Natasha Kapil gave a short insight into the tertiary education system and the innovative capacities of Poland. In the first part of their presentation, they illustrated the challenges concerning the adaptation of the Polish education system arising from changing demands for skills on the labor market (i.e. tendency for general up-skilling). Moreover, the speakers commented on the weak innovative performance of the Polish economy and outlined possible approaches to improve specific areas (e.g. co-patenting with foreign partners might support the import of technologies into Poland; measures stimulating business R&D such as tax breaks or matching grants).

The questions and answers concentrated on reform experiences from Lithuania (e.g. statutory vs. competitive funding of R&D institutions and student vouchers) and researchers' and students' mobility between the EU member states and neighboring countries such as Turkey (e.g. visa problems, blue card system).

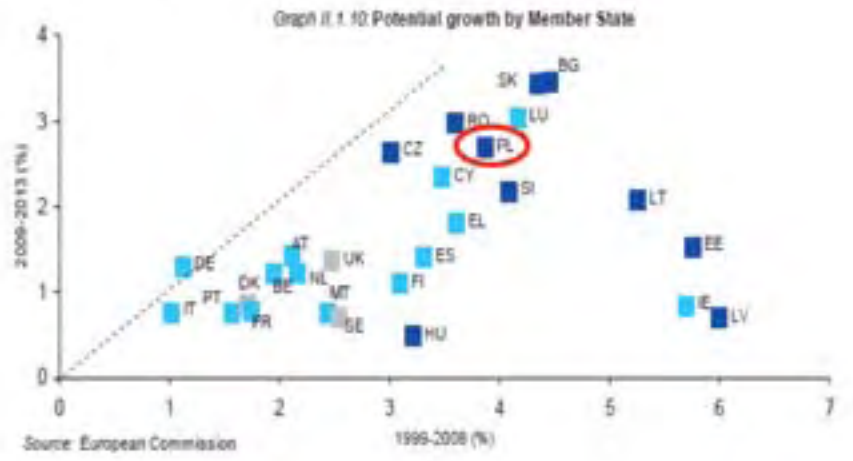
Poland has gone through the crisis in flying colors

Real GDP growth rates in percent



Source: DataStream, World Bank, Global Economic Prospects 2010: Crisis, finance, and growth

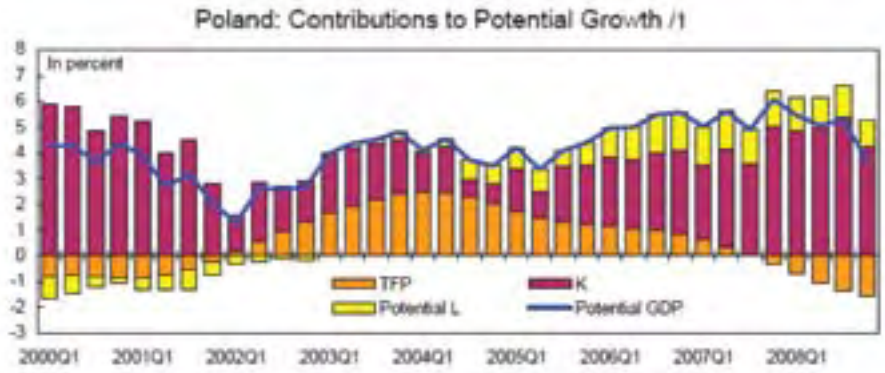
EC sees potential growth still significant but lower



Source: European Commission

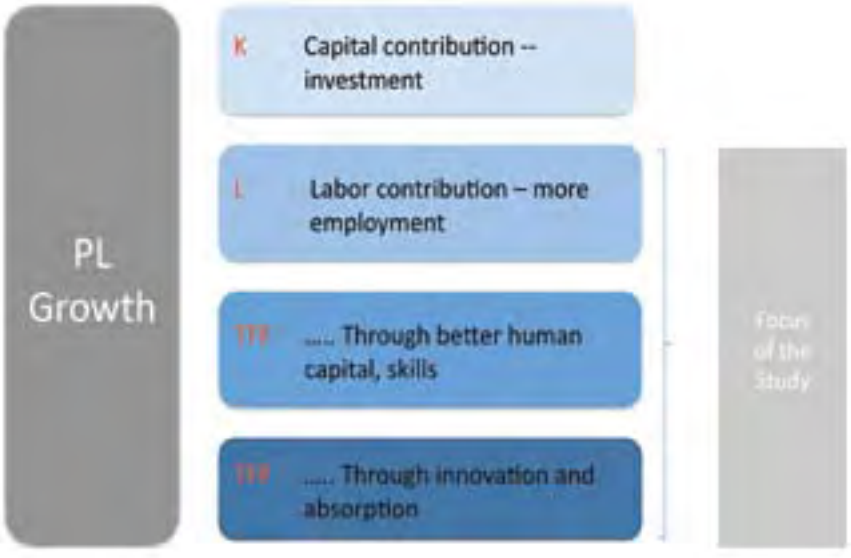
Capital was driver in the past – and is likely to be in future

In meantime revisit employment and labor productivity



Source: Epstein and Macciarelli (2010)

Policy levers to support growth

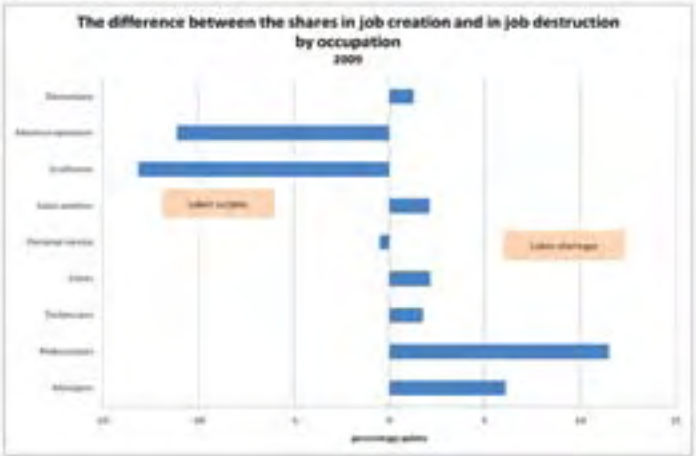


Employment can still drive growth

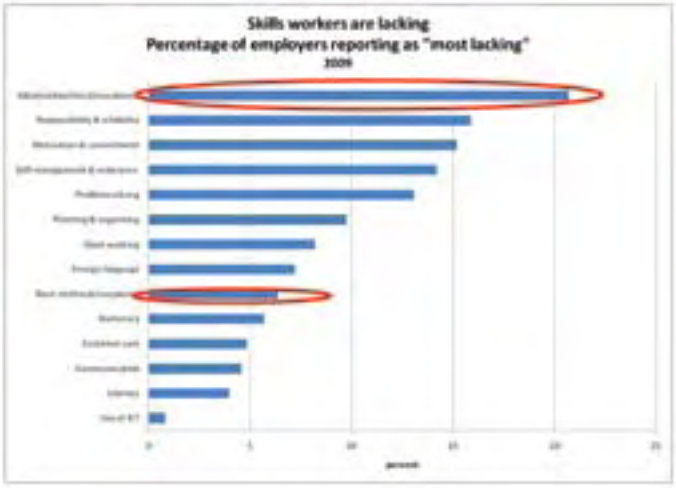
- EU 2020 headline target: 75 % of the population aged 20-64 should be employed
- Poland: 65% employed ➔ substantial gap
- Why is the employment rate so low in Poland?
  - 50+
  - Women
  - Youth
- Focus on education and skills as *one* key factor affecting employment outcomes

Changing skills demand side – does the education system keep up?

From low level to high level skills

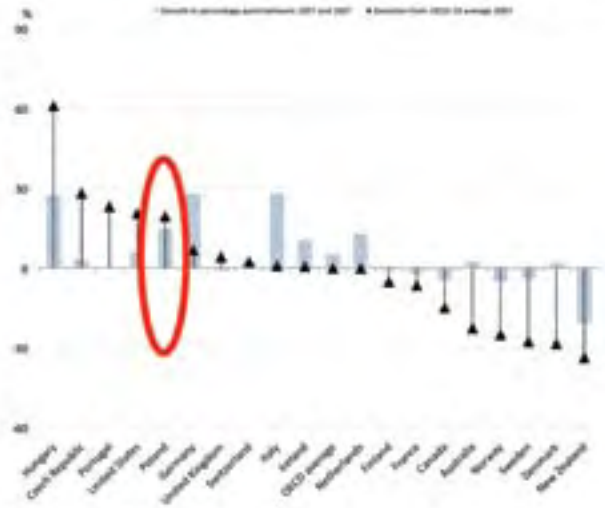


LM entrants lack skills required by employers



Labor market continues to reward TE

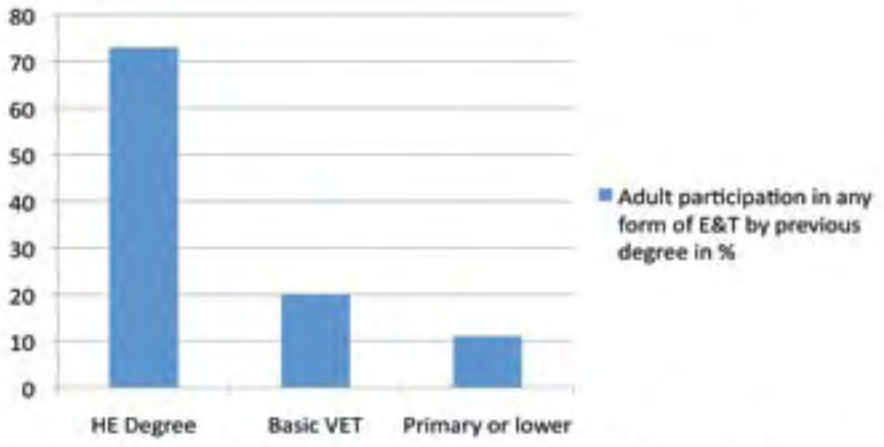
Average relative earnings growth at the tertiary level of education between 1997 and 2007 and average relative earnings at the tertiary level of education deviation from the OECD average (2007)



Source: Education at a Glance, 2009

'The learning rich get richer'

Adult participation in E&T only 50% EU average



Comment: Urban, 23% with 62% population urban. Rural: 12% with 18% LM participations (but only 10% farmers)

Demand for higher level/more generic skills

But education system needs paradigmatic shift

FROM:	TOWARDS:
Knowledge	Knowledge, skills and competences
Input-based 'standards'	'Learning outcomes' –
Isolated degrees	Qualification frameworks –
Focus on formal education	Combination of formal, informal, non-formal
Focus on subject-related skills	Combination of generic and subject-related skills
Tracking and 'dead ends'	Flexible learning paths, permeable systems
Power of traditional providers	More open systems/markets
Education is a defined phase in life	Lifelong Learning

Emerging policy recommendations on education/skills

- Develop overarching lifelong learning approach: consider lifecycle of the learner, starting from Early Childhood Development
- Connect to employers: National Qualifications Framework, governance of TE, schools
- Increase access to adult education: good practice in Scandinavian countries, Ireland, etc.
- Take demographic developments into account when steering TE sector
- Revamp Bachelor
- Connect TE and research as well as third function of universities
- Equitable TE financing system
- Quality Assurance: internal QA and additional transparency tools

Improving Poland's Capacity to Innovate

THE WHAT:

EUROPE 2020 TARGET 3% R&D/GDP

- Poland barely spends 0.6% R&D/GDP
- Desirable? Yes, But ...*efficiency first*
- Timing Right? Perhaps, build on reform momentum

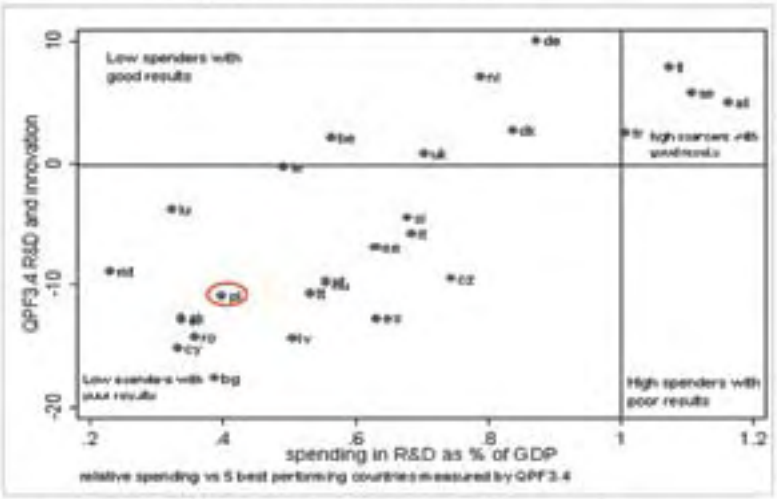
MINUTE SHARE OF PUBLIC R&D $ REACHES FIRMS & IS UNDERUTILIZED

- Firms *not* in the driver's seat (except SFs)

DISINCENTIVES FOR APPLIED RESEARCH IN PUBLIC RDIs

- RDIs gauged on metrics: publications, professorships
- Not by revenue for R&D/engineering services to firms

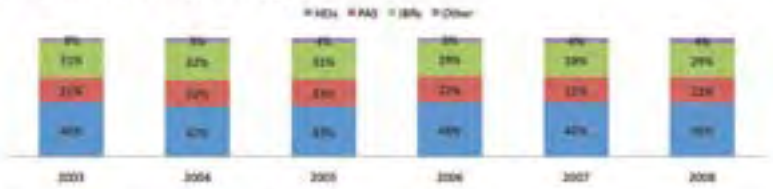
Poland spends little on R&D...
...with very poor outcomes.



Source: Economic Papers 382, DG Economic & Financial Affairs, July 2009.

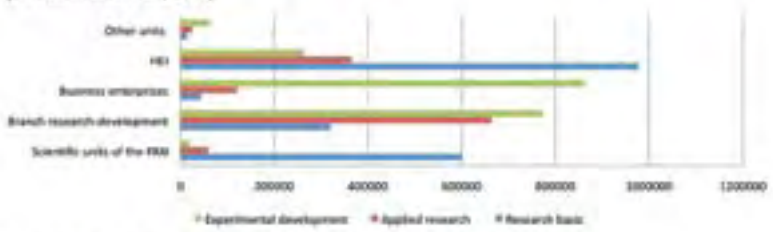
Where does public money go?

Distribution of budgetary funding by type of research institution



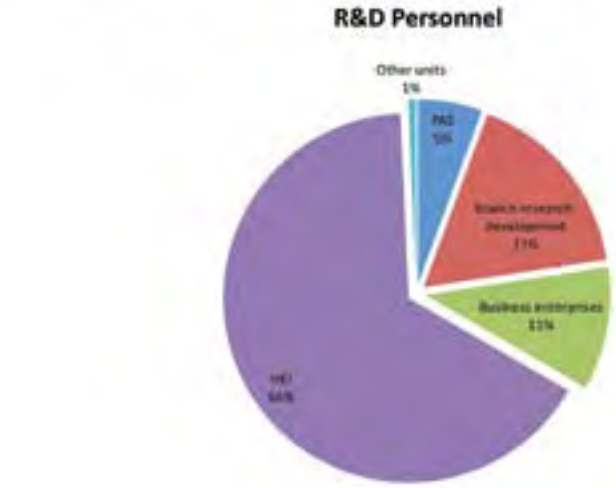
Source: Ministry of Science and Higher Education

Current expenditures by type of R&D activities and type of units (in thousands of PLN, 2007)



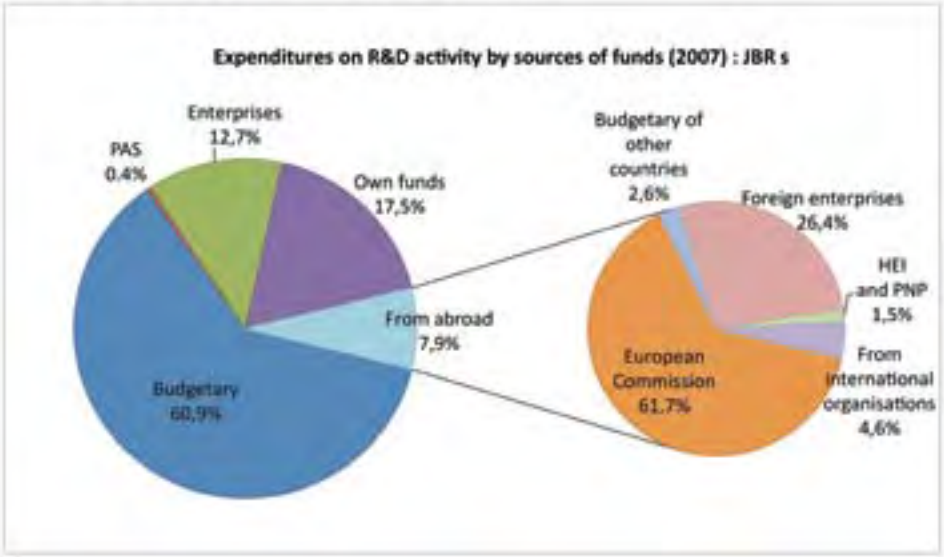
Source: Nauka i Technika w 2007, Central Statistical Office

R&D personnel employed by entity



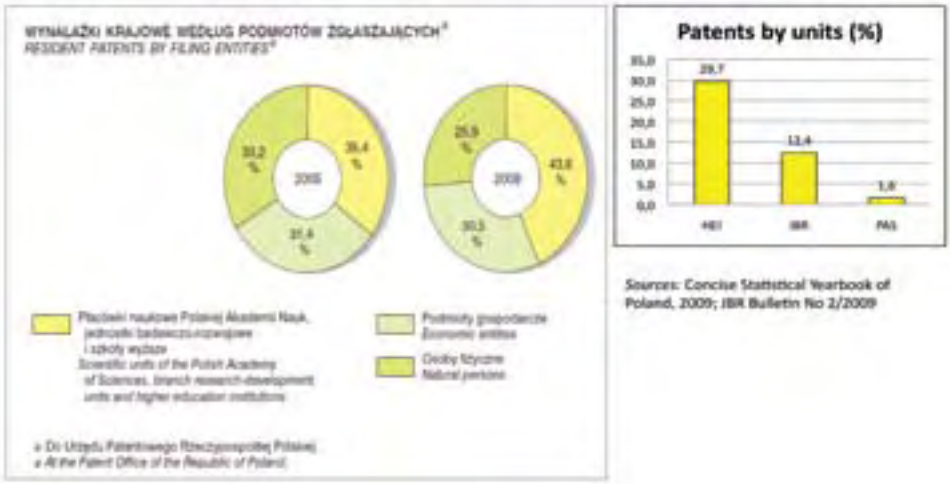
Source: Central Statistical Office, 2008

The devil is in the detail...



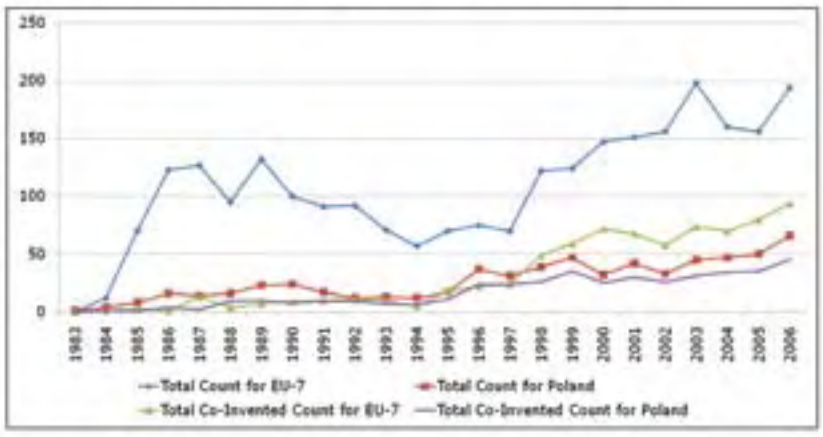
Source: Nauka i Technika w 2007, GUS

What do you get in return?



Sources: Concise Statistical Yearbook of Poland, 2009; IBR Bulletin No 2/2009

Invention and co-invention in Poland and the EU-7 (USPTO Data)



Source: USPTO


Leveling the innovation playground
THE HOW:
Restructuring the Research Sector
• Poland has initiated RDI reform, but not PAS
• Looming Challenges
– Financing: Categorization based on Differentiated Output
– Institutional: Exit Path for Commercialized RDIs Unclear
Leveraging Public Financing to Stimulate Enterprise R&D
• Matching Grants go for Technology Absorption (less for Innovation)
– Introduce International Peer Review
– Build Domestic Capacity for Technical and Commercial Reviews
• Improving Utilization of R&D Tax Breaks
– Delay vs. Double: Applied too early in start up lifecycle
– Firms wary of tax inspections
• KEF IX lessons: Innovation Assistant Program
Promoting International Knowledge Flows via Co-patenting
– Revamping MOSHE "Patent Plus" Program to promote co-inventions


Messages EU 2020
• Countries need to be ambitious (e.g. employment)
• Connect smart and inclusive growth (e.g. equity in education)
• Guidance and peer learning on common issues (e.g. Math Science Technology)
• R&D target: Feasible? Desirable?
• How to support countries, how to keep countries on track?

Plenary VII: Overview of the German Research System

Universities, industry research and non-university public research represent the three main pillars of the German research system. Particular attention is paid to the development and commercialization of innovation. The German government transfers innovations through specific channels. Acatech, the German Academy of Science and Engineering, is one example of supporting knowledge transfer between science and industry. The non-university research pillar is composed of four big research institutes; among these, the Max-Planck-Gesellschaft conducts fundamental research, while the Fraunhofer-Gesellschaft focuses on applied research. Linking research and industry at an early stage is of great importance to innovation success.

Universities and Research Organizations in Germany - An Overview
Reinhard F. J. Hüttl, President, German Academy of Science and Engineering

Prof. Dr. Dr. Reinhard Hüttl gave a brief overview on the German landscape of universities and research institutions, describing the function of central actors and providing information on the financial structures of the system. In this context, he illustrated that, despite ranging above OECD average and despite constant increases in R&D intensity, German R&D expenditures still exhibit a considerable gap compared to internationally leading countries like Sweden, Japan or the U.S.

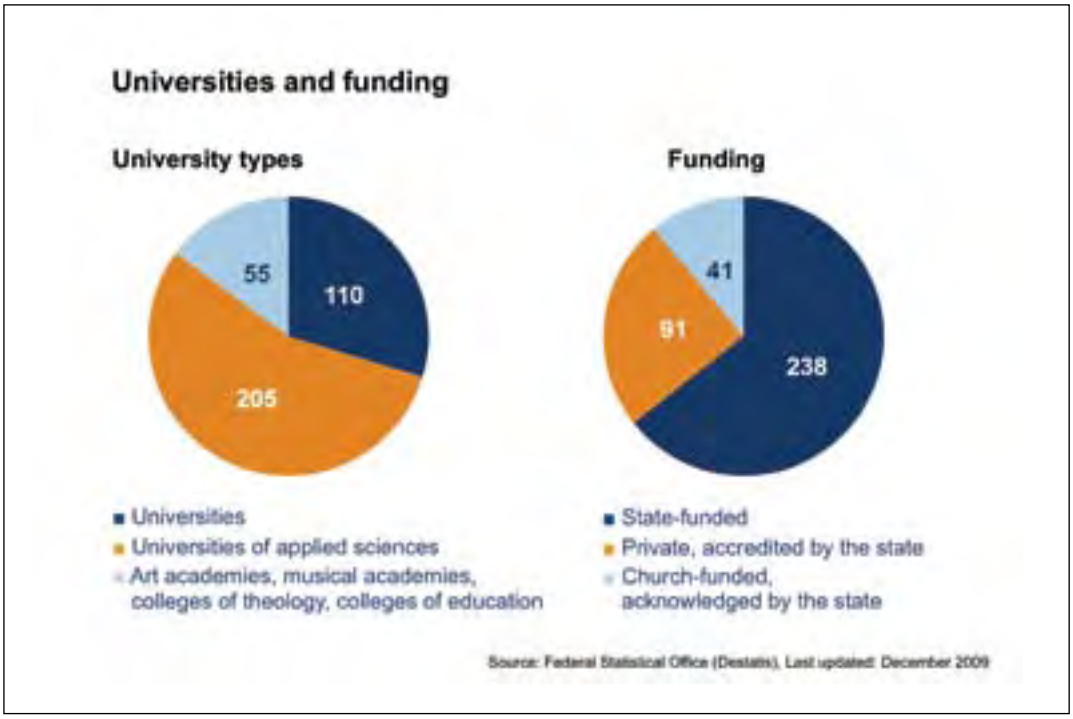
" Innovation is essential for the sustainable development of the economy"

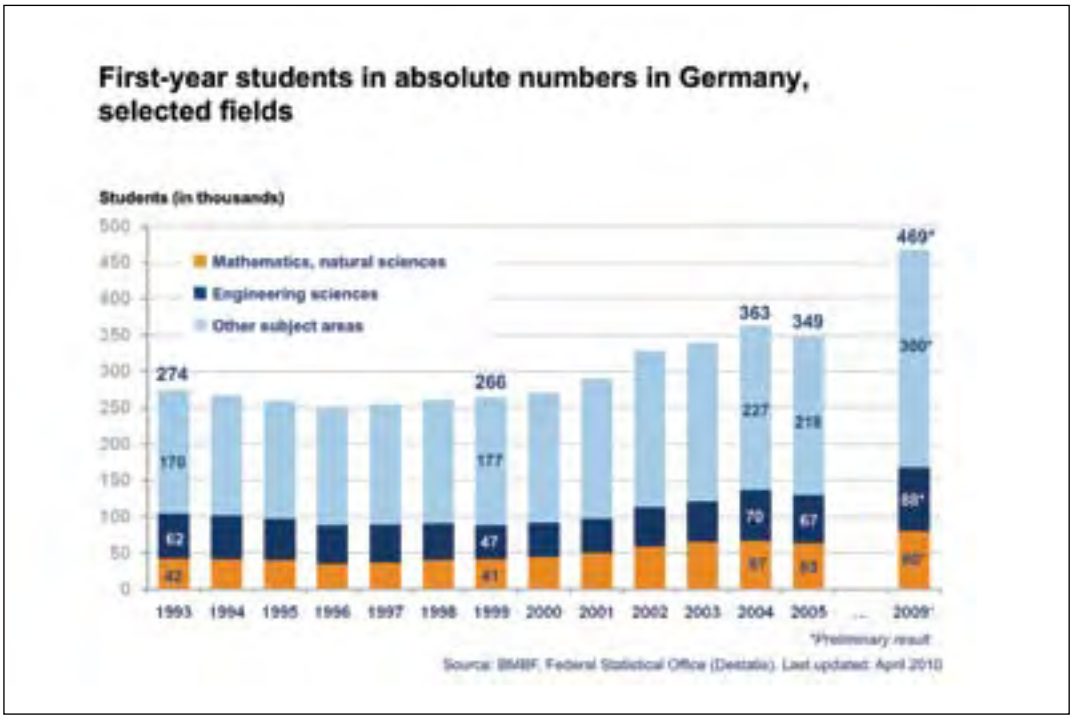
> Prosperity requires employment,

> Employment requires innovation,

> Innovation requires science and many bright minds!

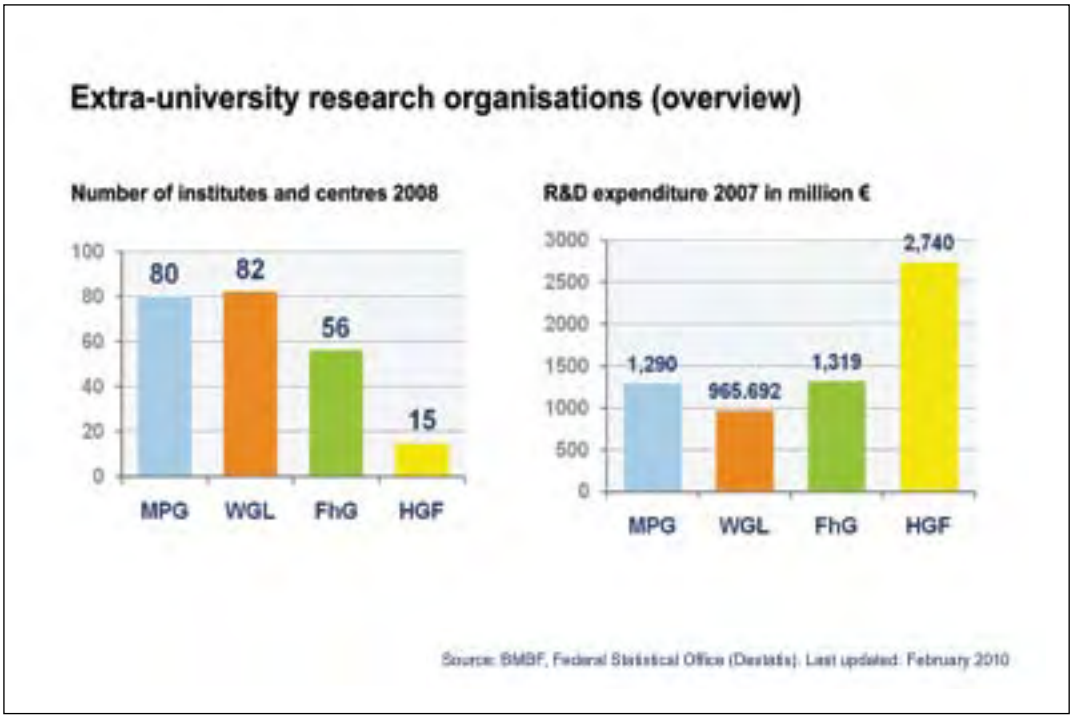
University and extra-university research organisations according to research focus

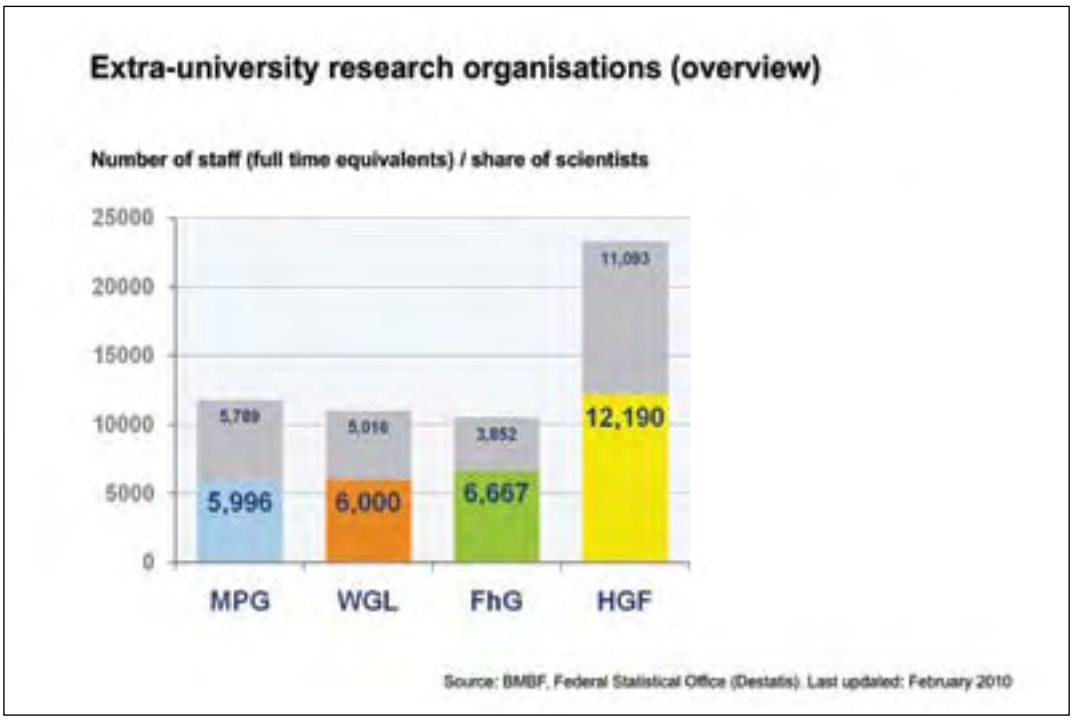

Universities and funding
University types
55
110
205
Universities
Universities of applied sciences
Art academies, musical academies, colleges of theology, colleges of education
Funding
41
91
238
State-funded
Private, accredited by the state
Church-funded, acknowledged by the state
Source: Federal Statistical Office (Destatis). Last updated: December 2009


First-year students in absolute numbers in Germany, selected fields
Students (in thousands)
Mathematics, natural sciences
Engineering sciences
Other subject areas
274
266
363
349
469*
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 ... 2009*
*Preliminary result
Source: BMBF, Federal Statistical Office (Destatis). Last updated: April 2010

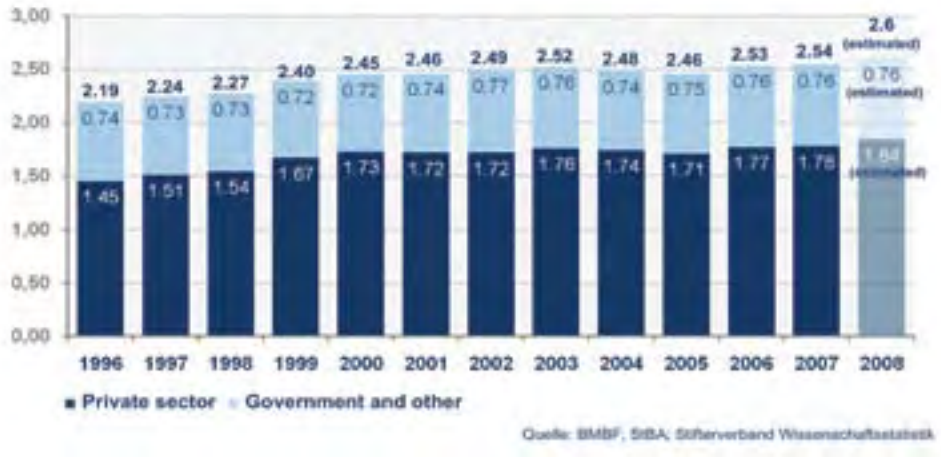

Higher education in Germany – reforms
Bachelor and master degrees
Accreditation
Tuition
Aim:
To strengthen the international competitiveness of education and research
Excellence Initiative
(Graduate Schools, Clusters of Excellence and Institutional Strategies to Promote Top-level Research in Germany)
Selection tests
Autonomy of universities
Partnerships e.g. between universities and the private sector
Private universities


Extra-university research organisations
Helmholtz Association of National Research Centres (HGF)
Expenditure: 2.1 billion €
Ratio of funding: 90 : 10
External funding: 900 million €
Max Planck Society for the Advancement of Science (MPG)
Expenditure: 1.3 billion €
Ratio of funding: 50 : 50
External funding: 260 million €
Fraunhofer Society (FhG)
Expenditure: 395 million €
Ratio of funding: 90 : 10
External funding: 800 million €
Leibniz Association (WGL)
Expenditure: 852 million €
Ratio of funding: 50 : 50
External funding: 350 million €
All data for 2009

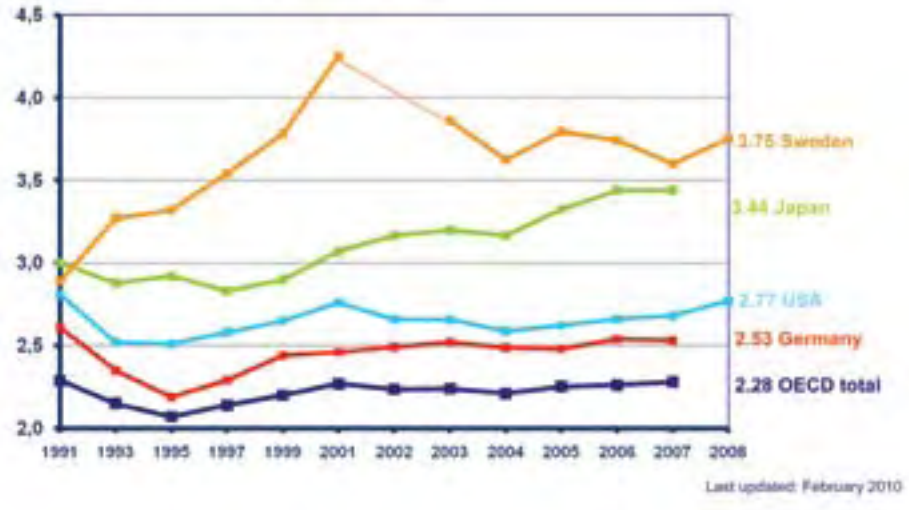

Extra-university research organisations (overview)
Number of institutes and centres 2008
100
80
60
40
20
0
80
82
56
15
MPG
WGL
FhG
HGF
R&D expenditure 2007 in million €
3000
2500
2000
1500
1000
500
0
1,290
965.692
1,319
2,740
MPG
WGL
FhG
HGF
Source: BMBF, Federal Statistical Office (Destatis). Last updated: February 2010


Extra-university research organisations (overview)
Number of staff (full time equivalents) / share of scientists
25000
20000
15000
10000
5000
0
5,709
5,996
5,016
6,000
3,852
6,667
11,093
12,190
MPG
WGL
FhG
HGF
Source: BMBF, Federal Statistical Office (Destatis). Last updated: February 2010

Gross domestic expenditure for research and development (GERD) in Germany in billion € and as a share of the gross domestic product



R&D expenditure in 1991-2008
Share of GDP in % (Target: 3 %)



Science and reunification

> **Decisions in the years 1989/1990:**
- Establishment of an integrated science landscape

> **Changes implemented from 1990 to 1992:**
- The discontinuation of the science system of the GDR and the development of a new science system in eastern Germany utilizing the West German system as a role model

Science and reunification

> **The results (not including Berlin):**

- Establishment or re-establishment of numerous universities and research institutes (56 universities of applied science, private etc./ 5 universities were discontinued; 3 new universities were founded (Cottbus, Frankfurt/Oder, Erfurt)
- Performance level remains differentiated (2.3% of excellence initiation funding)
- R&D investments: western Germany 67% industry sector
  33% public sector
  eastern Germany 80% public sector
- Personal: 50% reduction at universities
- Discontinuation of academy research system
  new approach: working academies

The INSTITUTION
The voice of science and technology in Germany

> acatech: independent and self-determined representation of science and technology in Germany and abroad

> Institutional funding by the federal government and the 16 federal states as a national academy since January 2008

> Under the patronage of the Federal President of Germany since October 2008

> The network (status: spring 2010):

- 329 members in Germany and abroad
- 83 senators
- Head office in Munich
- Capital office in Berlin

The OBJECTIVES
Providing knowledge, guidance and support

Scientific recommendations

> acatech advises policy makers and the public on future technology issues based on the best available scientific knowledge

Knowledge transfer

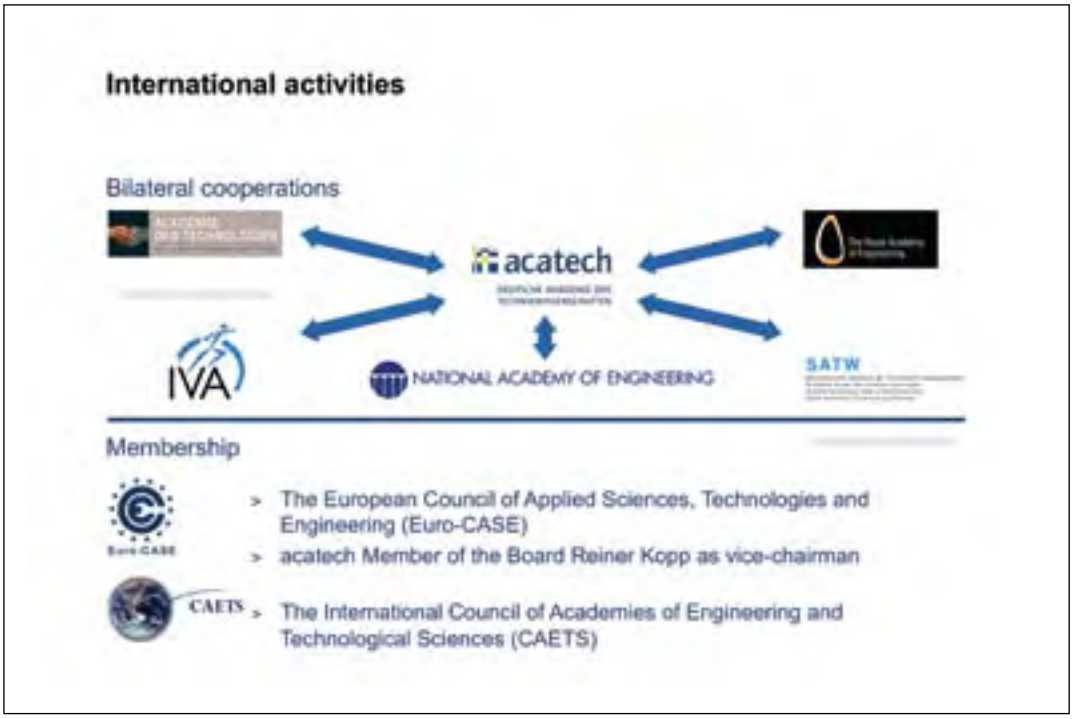
> acatech offers a platform for exchange that fosters cooperation between science and business

Promotion of young scientists and engineers

> acatech is committed to supporting young scientists and engineers

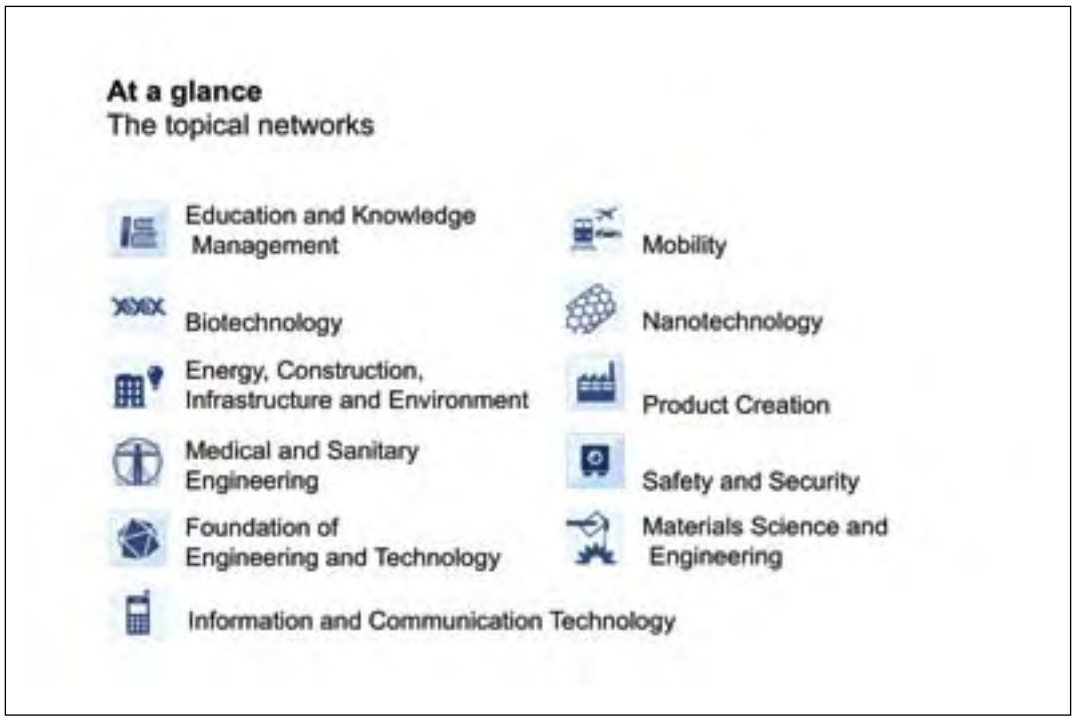
Voice of science and engineering

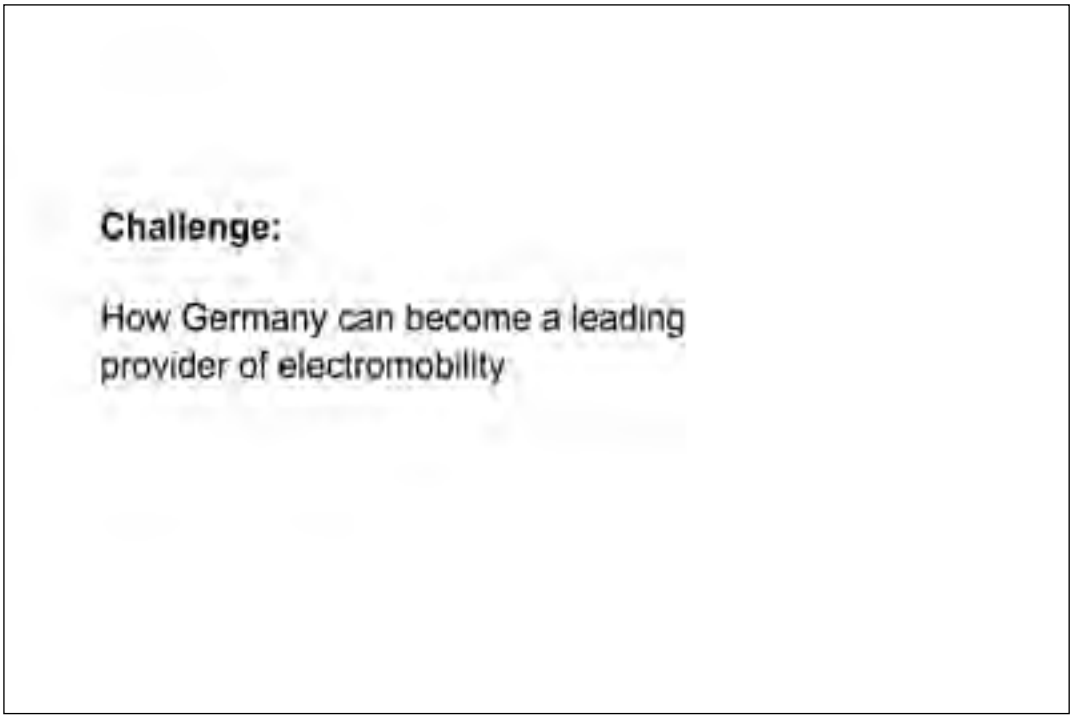
> acatech represents the interests of science and engineering at a national and international level

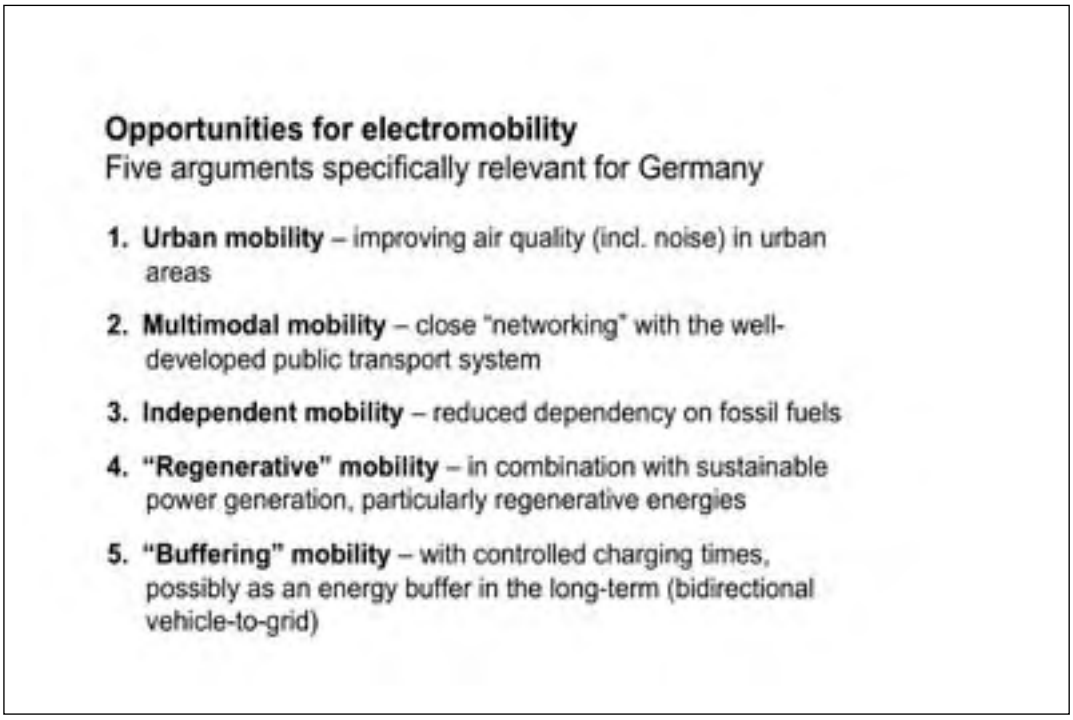

International activities
Bilateral cooperations
acatech
IVA
NATIONAL ACADEMY OF ENGINEERING
SATW
Membership
> The European Council of Applied Sciences, Technologies and Engineering (Euro-CASE)
> acatech Member of the Board Reiner Kopp as vice-chairman
CAETS
> The International Council of Academies of Engineering and Technological Sciences (CAETS)


Financing
Ensuring independence and stability
Donations and project sponsorship
Core work
> Projects
> Events
> Other activities
Institutional sponsorship (by federal government and federal states)
Operational basis
> Academy
> Head office and capital office


acatech
GERMAN ACADEMY OF SCIENCE AND ENGINEERING
Supporters of acatech
Status: 2010
ABB
DEKRA
DB
SAP
FESTO
SIEMENS
IBM
UNITY AG
BOSCH
Mubea
STIHL
DAIMLER
GRILLO
SURTECO


At a glance
The topical networks
Education and Knowledge Management
Mobility
Biotechnology
Nanotechnology
Energy, Construction, Infrastructure and Environment
Product Creation
Medical and Sanitary Engineering
Safety and Security
Foundation of Engineering and Technology
Materials Science and Engineering
Information and Communication Technology


Challenge:
How Germany can become a leading provider of electromobility


Opportunities for electromobility
Five arguments specifically relevant for Germany
1. Urban mobility – improving air quality (incl. noise) in urban areas
2. Multimodal mobility – close "networking" with the well-developed public transport system
3. Independent mobility – reduced dependency on fossil fuels
4. "Regenerative" mobility – in combination with sustainable power generation, particularly regenerative energies
5. "Buffering" mobility – with controlled charging times, possibly as an energy buffer in the long-term (bidirectional vehicle-to-grid)

An overview of acatech recommendations:

1. **Electromobility should be viewed as an interdisciplinary national effort** – no company, sector or scientific discipline can master this on its own
2. **Germany must become a leading supplier of electromobility** – not just the lead market
3. **Promotion instruments should be concentrated**
4. **Pilot regions** should be strengthened as a window for export
5. **Electromobility must be embedded in the overall context** – the future "mobility" should not be reduced to electromobility
6. **Promotion of "systemic" education at all levels**

Effect: National e-mobility Summit, May 3 - coordinated by acatech

New challenge for acatech!

Define, organise and conduct National Innovation Dialog for the German Government on the request of the Chancellor Frau Dr. Merkel


"Ageing in Germany"
AKADEMIENGRUPPE ALTERN IN DEUTSCHLAND
A joint academy group of acatech and Leopoldina


"Ageing in Germany"
AKADEMIENGRUPPE ALTERN IN DEUTSCHLAND
> Aim: identifying the potential of an ageing society
> Interdisciplinary approach including representatives from industry and society
> Topics: ageing – and: family, civil society, politics, urban and regional development, environment, technology, elderly people as a work force

The result: a recommendations volume entitled "More Years, More Life" – and eight materials volumes

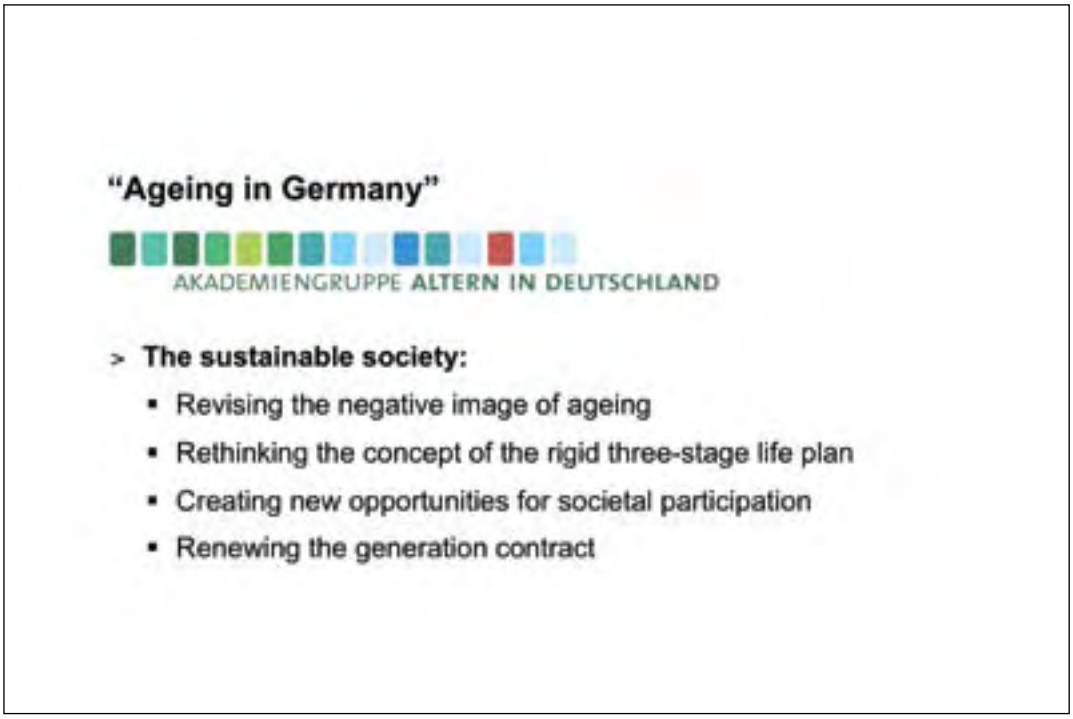
> Handing over of the "More Years, More Life" volume to the President of the Federal Republic of Germany, Horst Köhler

"Ageing in Germany"

AKADEMIENGRUPPE ALTERN IN DEUTSCHLAND

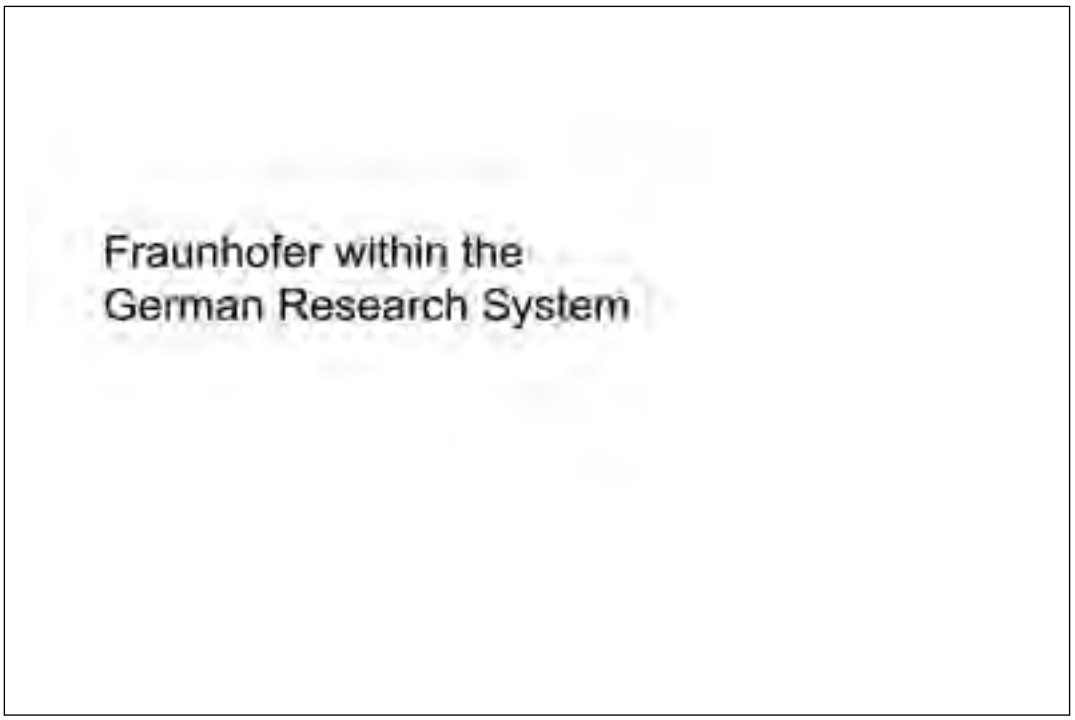
> **Opportunities for individuals:**
- Recognising and taking advantage of the opportunities offered by a new image of ageing – 7 years difference
- "Take care of your health" - prevention
- Lifelong learning – brain/mind fitness
- New job options – experience counts

> **Consequences for companies and the working world:**
- To employ older people and to employ them longer
- To optimise the organisation of work for ageing people
- To flexibly accommodate changes in job profiles
- To continuously invest in improving the qualification of employees – until retirement


"Ageing in Germany"
AKADEMIENGRUPPE ALTERN IN DEUTSCHLAND
> The sustainable society:
▪ Revising the negative image of ageing
▪ Rethinking the concept of the rigid three-stage life plan
▪ Creating new opportunities for societal participation
▪ Renewing the generation contract

Fraunhofer Within the German Research System
Hans-Jörg Bullinger, President, Fraunhofer Gesellschaft

Prof. Dr. Hans-Jörg Bullinger raised one essential question that all countries with an explicit research orientation have to face: How can financial resources be effectively transferred into knowledge and, vice versa, how can knowledge be transferred into new and marketable products and processes? With regard to this question, Prof. Dr. Hans-Jörg Bullinger emphasized the role of applied research institutions and the relevance of an effective collaboration between research and industry partners.



The Fraunhofer-Gesellschaft

Fraunhofer undertakes applied research of direct utility to private and public enterprise and of wide benefit to society.

Our Customers:

- Industry
- Service sector
- Public administration

Joseph von Fraunhofer

The Fraunhofer-Gesellschaft

Discovery of "Fraunhofer Lines" in the sun spectrum	Researcher	Research and development for the industry, service sector and public administration
New methods of lens processing	Inventor	e.g.: 2 patent applications each working day
Head of Royal Glass Factory	Entrepreneur	1.6 billion € budget per year

The Fraunhofer-Gesellschaft in Germany

- 59 Institutes
- 17 000 employees

Fraunhofer Worldwide

- Broaden the Fraunhofer knowledge base through cooperation with excellent partners
- Develop foreign markets
- Opening up new business segments
- Follow German customers

6 Representative Offices
4 Country Senior Advisors
15 Research Units

Fraunhofer Project Center for Production Management and Informatics in Budapest

Cooperation Partners:

1) SZATKI "Computer and Automation Research Institute" at the Hungarian Academy of Sciences MTA

2) FhG-IPA

3) FhA PL

Opening May 2010 in Budapest

Director of the Project Center:
László Monostori,
D.Sc., Deputy Director Research, MTA SZATKI,

Demands on a Fraunhofer Institute

Scientific competence proved by the recognition of the scientific community

Well-balanced financial mix of different independent sources

Market success and entrepreneurial competence proved by contracts with industry and government

Professional networking with other Fraunhofer Institutes and externals

The Profile of the Fraunhofer-Gesellschaft

- 59 Institutes
- 17 000 employees

7 Groups:

- Information and Communication Technology
- Life Sciences
- Microelectronics
- Light & Surfaces
- Production
- Materials and Components - MATERIALS
- Defense and Security

Fraunhofer Groups

Microelectronics (founded 1996)

- CNT, Dresden
- ENAS, Chemnitz
- ESK, München
- HHI, Berlin
- IAF, Freiburg
- IIS, Erlangen
- IISB, Erlangen
- IMS, Duisburg
- IPMS, Dresden
- ISIT, Itzehoe
- IZM, Berlin
- FHR, Wachtberg

Gäste:

- Fokus, Berlin
- IDMT, Ilmenau
- IZFP, Saarbrücken

Materials and Components - MATERIALS (founded 1997)

- EMI, Freiburg
- IAP, Potsdam
- IBP, Stuttgart
- ICT, Pfinztal
- IFAM, Bremen
- IKTS, Dresden
- ISC, Würzburg
- ISE, Freiburg
- ISL, Karlsruhe
- IWM, Freiburg
- IZFP, Saarbrücken
- LBF, Darmstadt
- WKI, Braunschweig

Gast:

- ITWM, Kaiserslautern

Production (founded 1998)

- IFF, Magdeburg
- IML, Dortmund
- IPA, Stuttgart
- IPK, Berlin
- IPT, Aachen
- IWU, Chemnitz
- UMSICHT, Oberhausen

Light & Surfaces (founded 1998)

- FEP, Dresden
- ILT, Aachen
- IOF, Jena
- IPM, Freiburg
- IST, Braunschweig
- IWS, Dresden

Life Sciences (founded 2000)

- IBMT, St. Ingbert
- IGB, Stuttgart
- IME, Schmallenberg, Aachen
- ITEM, Hannover
- IVV, Freising
- IZI, Leipzig
- EMB, Lübeck

ICT Group (founded 2001)

- FIRST, Berlin
- FIT, St. Augustin
- FOKUS, Berlin
- IAIS, St. Augustin
- IAO, Stuttgart
- IDMT, Ilmenau
- IESE, Kaiserslautern
- IGD, Darmstadt
- IOSB, Karlsruhe
- ISST, Berlin
- ITWM, Kaiserslautern
- MEVIS, Bremen
- SCAI, St. Augustin
- SIT, Darmstadt
- FKIE, Wachtberg

Gäste:

- ESK, München
- HHI, Berlin
- IIS, Erlangen

Defense and Security (founded in 2002), Research for Ministerial Departments

- EMI, Freiburg
- IAF, Freiburg
- ICT, Pfinztal
- INT, Euskirchen
- FHR, Wachtberg
- FKIE, Wachtberg
- IOSB, Karlsruhe

Gast:

- IIS, Erlangen

Fraunhofer Alliances

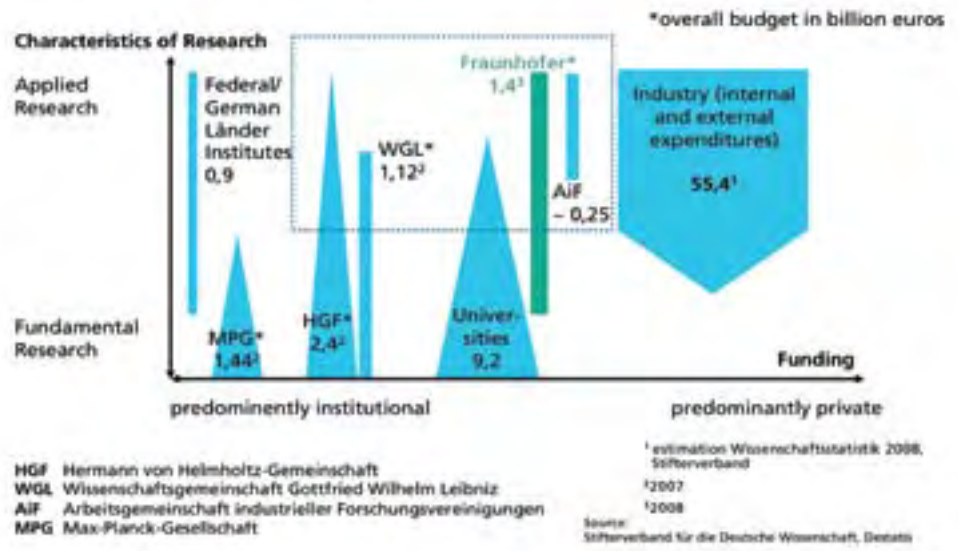
- Adaptronics
- Advancer
- Ambient Assisted Living
- Building Innovation
- Digital Cinema
- eGovernment
- Energy
- Food Chain Management
- Grid Computing
- Nanotechnology
- Optic Surfaces
- Photokatalysis
- Polymer Surfaces
- Rapid Prototyping
- Cleaning Technology
- Simulation
- Water Systems (SysWasser)
- Traffic and Transportation
- Vision

Innovation Clusters -

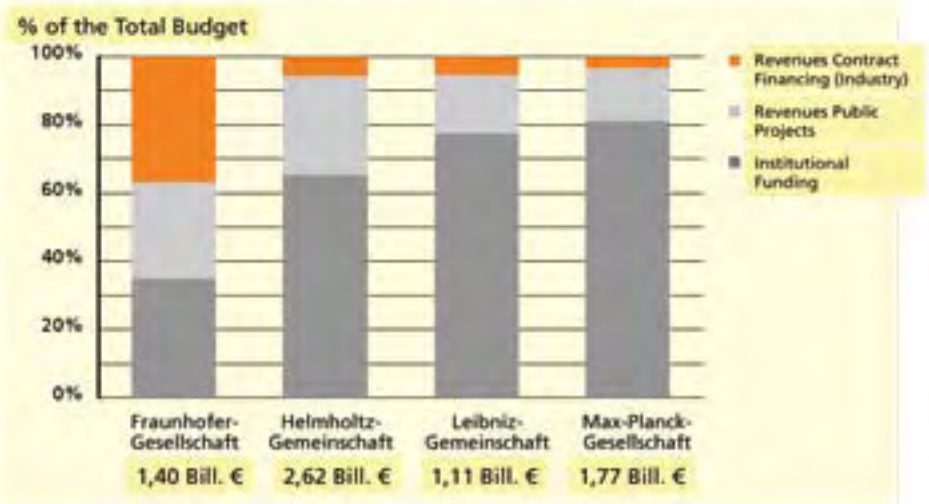
Close Cooperation between Governments of German Länder, Universities, Industry and Fraunhofer

1. Digital Production
2. Mechatronic Machine Systems
3. Optical Technologies (JOIN)
4. Automotive Quality Saar
5. Digital Commercial Vehicle Technology (DNT)
6. Nano for Production
7. Personal Health
8. Adaptronics
9. Future Security BW
10. Technologies for Hybrid Lightweight Construction (KITe HyLITE)
11. Multifunctional Materials and Technologies (MultiMaT)
12. Polymer Technologies
13. Virtual Development, Engineering and Training (VIDET)
14. Turbine Production Technologies (TurPro)
15. Secure Identity
16. Maintenance, Repair and Overhaul in Energy and Traffic (MRO)
17. Electronics for Sustainable Energy Use (under developm.)
18. Cloud Computing for Logistics (under development)

The German Research Landscape



Financing of the Research Institutions in Germany 2008



Frontline themes - Tomorrow's opportunities

People need

- an affordable healthcare system
- security
- energy
- communications
- mobility
- and a clean environment.

The Fraunhofer-Gesellschaft has identified strategic research areas in which it is seeking answers to these challenges of the future. In focusing on twelve frontline themes, the Fraunhofer-Gesellschaft is pointing out particularly effective courses of action. Its objective is to employ new technologies to devise solutions that will make our life healthier, safer and simpler, and will be kinder to the environment.

Frontline themes - Tomorrow's opportunities

Assisted Personal Health
The electronic guardian angel

Decentralized integrated water management
Saving precious water

Bio-functional surfaces
High tech with a sensitive skin

Energy-efficient modernization
More than just a facade

Food chain management
Always fresh on the table

Solid-state light sources
Bright and efficient illumination

Frontline themes - Tomorrow's opportunities

Energy storage in power grids
Solar and wind-generated electricity on demand

Visual analytics
A clear overview in the data jungle

Green powertrain technologies
New impetus for eco-friendly cars

Hybrid material structures
Combining the best of the best

Energy self-sufficient sensors and sensor networks
Vigilant clusters

Integrated localization technology
On the move – quick and safe

The German Hightech Strategy

- **Pooling strengths**
  - Cooperation between science and industry
  - Strategic partnerships and innovation alliances
  - Accelerate and streamline the transition from product development to a marketable product
- **Focusing on lead markets**
  - Health, climate and resource efficiency, mobility and security
- **Improving framework conditions**
  - Improving conditions for SME
  - Protection of IP improved
  - Innovation-oriented procurement
- **Evaluating strategies**
  - Research council (»Forschungsunion«) chaired by A. Oetker and H-J. Bullinger → updated Hightech Strategy (2009-2013)

Federal Ministry for Education and Research is about to launch update of German Hightech Strategy

- In 2006 the German government published its Hightech Strategy focussing on 17 topical and 10 horizontal fields
  - ➢ first time ever Germany announced a comprehensive research strategy
- The roll-out of the strategy was guided by a research council (»Forschungsunion«) chaired by Arendt Oetker and Hans-Jörg Bullinger
- The »Forschungsunion« reviewed the status in 2009 and published recommendations for an updated Hightech Strategy to be implemented in the new election period (2009-2013)
- The re-appointed Federal Minister for Education and Research, Annette Schavan, re-constituted the research council under the leadership of Arendt Oetker and Hans-Jörg Bullinger in February 2010 and is about to publish an update of the Hightech Strategy

Suggestion of "Forschungs-Union" for architecture of updated german Hightech Strategy:
Focus on global challenges

How Basic Research Generates Innovation
Peter Gruss, President, Max Planck Gesellschaft

Prof. Dr. Peter Gruss expanded on this issue by picking up the concept of the knowledge cycle which aims at the integration of knowledge creation, knowledge utilization and the transfer of knowledge. He emphasized the long-term role of basic research within the innovation process.

Knowledge-based society

Joseph Alois Schumpeter
Austrian economist (1883-1950)

Innovation = creative destruction = driving force of the economy

Incremental innovations

Development of existing products and processes

Breakthrough innovations

Development of new added-value potential

R&D – a key engine of growth

Robert Solow
Nobel Prize in Economics (1987)

"A Contribution to the Theory of Economic Growth" (1956)

Technological advancement, rather than labour and capital, is the driving force in economic growth in industrial countries:

The introduction of new technologies accounts for up to 80% of gross domestic product

→ Investment in R&D is the key factor for economic growth in modern industrial countries.

Basic research – a factor in modern growth policy

Country	Basic research expenditure as a percentage of GDP		Basic research as a percentage of R&D	
	1993	2004	1993	2004
United States	0.44	0.50	17.5	18.7
Austria	0.31	0.39	21.5	17.5
France	0.52	0.52	21.9	24.3
Germany	0.43	–	18.9	–
Norway	0.25	0.28[1]	14.5	16.2[1]
Portugal	0.14	0.19[2]	24.1	25.7[2]
Switzerland	0.80[3]	0.84	30.0[3]	28.7
Japan	0.39	0.38	13.7	11.9
China	0.03	0.07	4.3	5.3

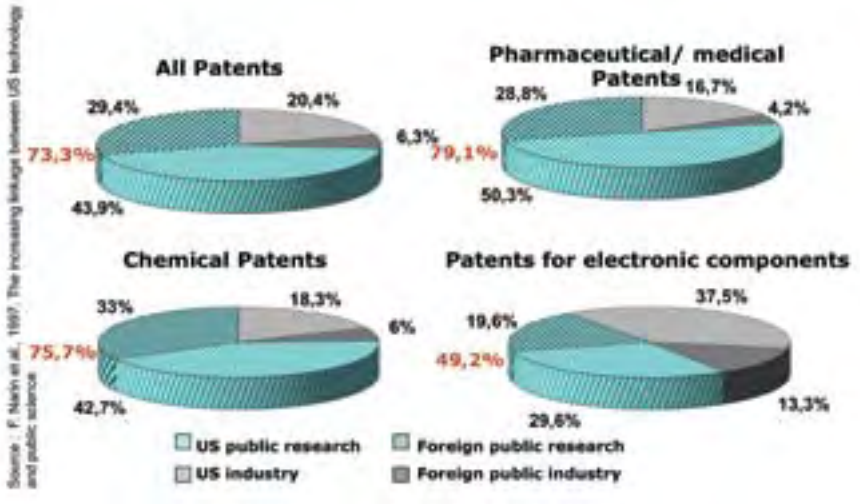
Hans Gernsbach, Center of Economic Research, Swiss Federal Institute of Technology:

„How much a country should invest into basic research can only be answered within a new growth concept. (...) We find that the more technologically advanced a country is, the more the amount of optimal basic research expenditures increases."

Source: Hans Gernsbach, Basic Research and Growth Policy, December 2007 (Table OECD MSTI, Vol. 2006/2)

Importance of publically funded research for industry

Academic research of vital importance for innovative products.



Economic benefits of
research institutions for Boston/USA

- 8 universities
- Expenditure on research: US$ 1.7 billion p.a.
- Economic significance for the regional economy: estimated at US$ 7 billion
- Around US$ 3.9 billion is generated for the greater Boston area from salaries, goods, services and construction.
- 50,000 direct + 35,750 indirect jobs

Source: Engines of Economic Growth, 2003

The Max Planck Society

Mission

Advancing innovative and
interdisciplinary research
of highest quality
at the frontiers of knowledge

Knowledge must precede application.

(Max Planck, 1858 - 1947, Nobel Laureate 1918)

The Max Planck Society ...

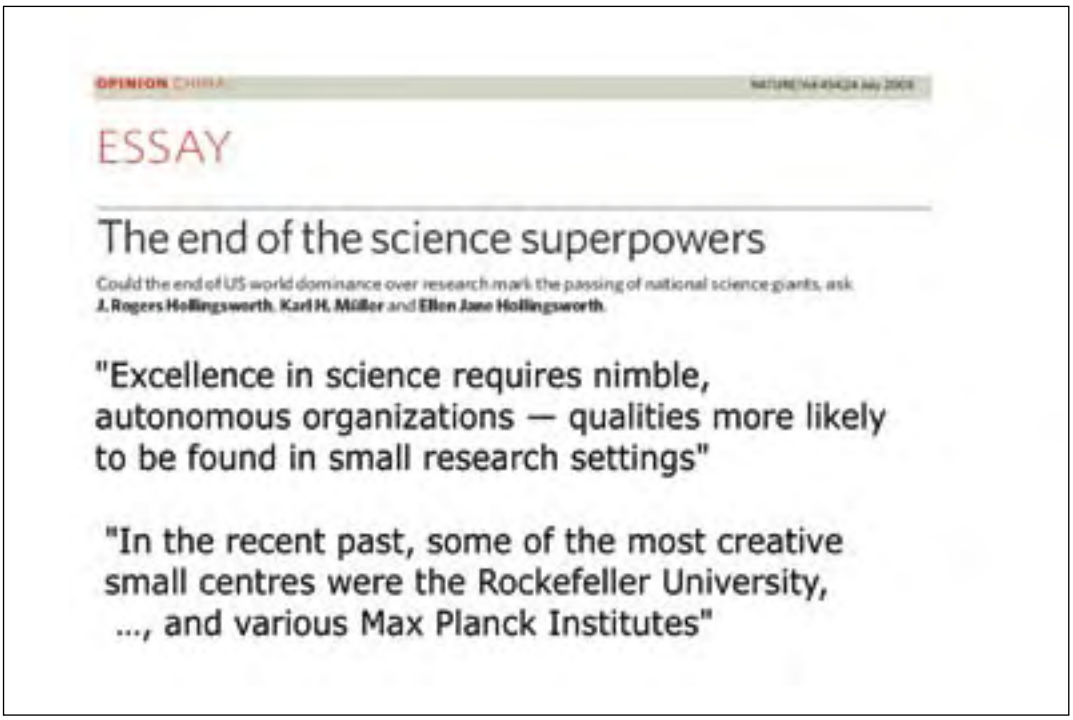
- ... promotes **outstanding researchers** from all nations who enjoy **autonomy** in the selection of their research subjects and methods
- ... combines unusual research subjects
- ... generates **flexible**, dynamic research units: Max Planck Institutes
- ... imposes stringent **quality control**
- ... receives stable **long-term institutional funding**
- ... is **internationally** oriented
- ... supports actively **technology transfer:** Max Planck Innovation

Facts and Figures

>13,300 staff members (Jan 1st, 2009)

plus 7,000 junior and guest scientists (Jan 1st, 2009)

annual budget 1.3 billion € (2009)
plus 300 million € third-party funds



OPINION CHINA

ESSAY

The end of the science superpowers

Could the end of US world dominance over research mark the passing of national science giants, ask J. Rogers Hollingsworth, Karl H. Müller and Ellen Jane Hollingsworth.

"Excellence in science requires nimble, autonomous organizations — qualities more likely to be found in small research settings"

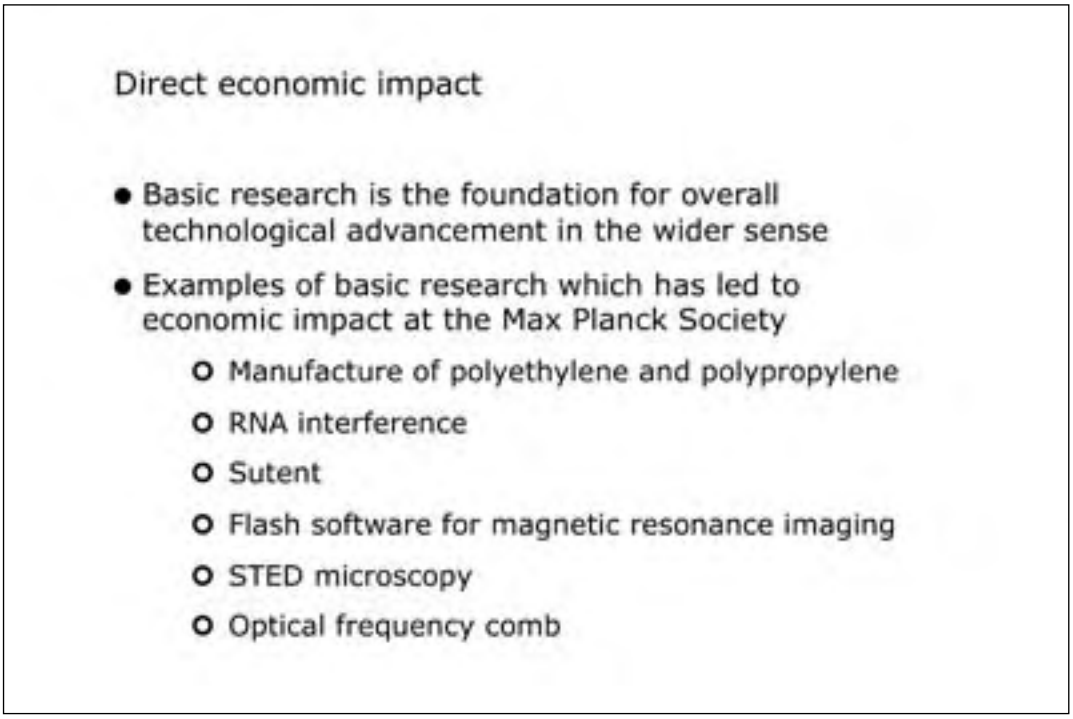
"In the recent past, some of the most creative small centres were the Rockefeller University, ..., and various Max Planck Institutes"

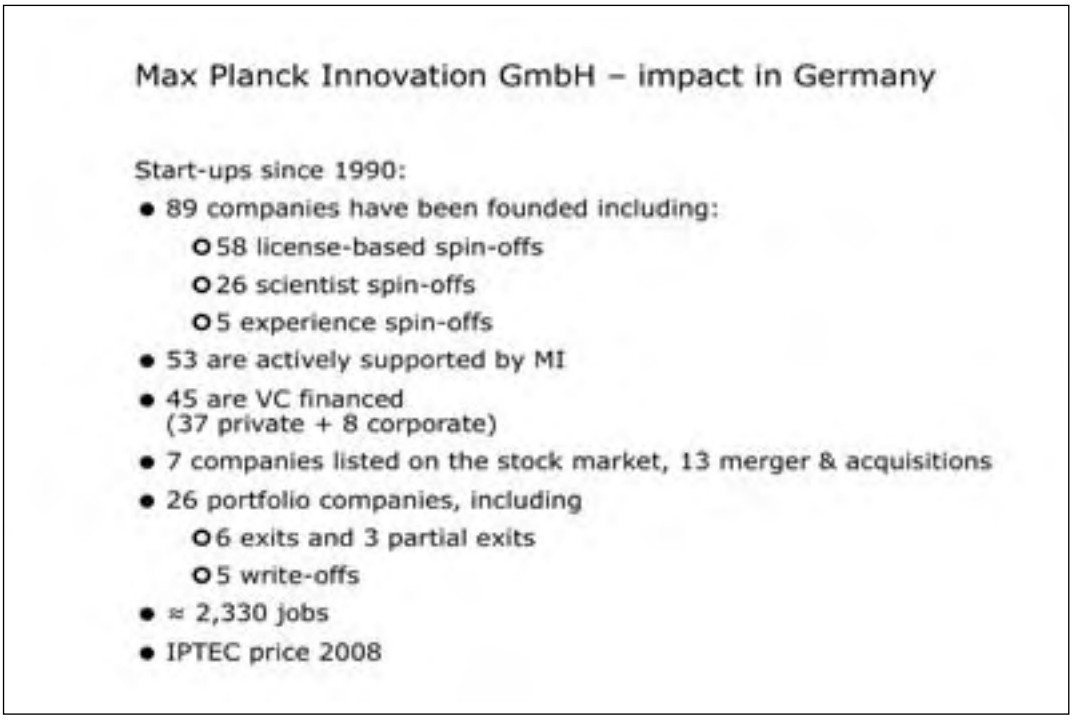
International bench marks

- **17 Nobel Price Winners since 1948**
  z. B. 2007 Gerhard Ertl (Chemistry), 2005 Theodor Hänsch (Physics), 1995 Christiane Nüsslein-Volhard (Medicine)
- **Impact of MPS publications**

Impact through scientific breakthroughs

- Decoding of Neanderthal genome (S. Pääbo)
  - Sequencing of prehistoric DNA laid the foundation for molecular investigation of human evolution
- STED microscopy (S. Hell)
  - Ultrahigh-resolution florescence microscopy (nanoscopy) enables observation of dynamic sub-cellular processes
- Optogenetics (E. Bamberg)
  - Light-induced stimulation of specific nerve cells with millisecond precision enables investigation of individual circuits of the brain in living organisms


Direct economic impact
Basic research is the foundation for overall technological advancement in the wider sense
Examples of basic research which has led to economic impact at the Max Planck Society
Manufacture of polyethylene and polypropylene
RNA interference
Sutent
Flash software for magnetic resonance imaging
STED microscopy
Optical frequency comb


Max Planck Innovation GmbH – impact in Germany
Start-ups since 1990:
89 companies have been founded including:
58 license-based spin-offs
26 scientist spin-offs
5 experience spin-offs
53 are actively supported by MI
45 are VC financed (37 private + 8 corporate)
7 companies listed on the stock market, 13 merger & acquisitions
26 portfolio companies, including
6 exits and 3 partial exits
5 write-offs
≈ 2,330 jobs
IPTEC price 2008

The „Innovation Gap"

- Industry as well as venture capital is mainly interested in advanced technology
- In biotechnology, for example, this means
  - preferably in clinical phase I or II
  - compounds (validated "leads")
  - broad platform technologies (such as RNA interference)
- Value of early technology is decreasing or the technology cannot be licensed at all, e.g. targets
  - Biotech industry as "incubator" for early technology is currently missing (concentrating on advanced projects as well)

Possible Solutions for Bridging the "Innovation Gap"

Validation of academic results

- Support programms (i.e. BMBF, BMWI, Max Planck internal)
- Fraunhofer Society
- Incubators
- Drug discovery centers

The VC crisis in Europe

- As a result of the "big crunch" in 2007 and 2008, the already limited amount of VC was further reduced.
- Even later stage companies are struggling to attract new investors to cope with their financial needs.
- VC-dependent industries are facing a potential collapse.

We need things such as

- Attractive tax systems for
  - Venture capital
  - R&D intensive companies
- Improvement of exit strategies
  - by Mergers and Acquisitions
  - by IPOs

International Co-operation
Partner Groups of Max Planck Institutes in ECA countries

Partner Groups
- are headed by selected talented former MPI PostDocs with proven research records
- offer a „return incentive" for higly-skilled researchers
- form the basis for sustainable research links and
- contribute to a competitive research environment in their home countries

Research Partners in ECA countries 2008 (in total 672)

International cooperation of the Max Planck Institutes
- creates scientific „added value" and „critical masses" and
- increases scientific production and productivity.

➢ Best-practise: „bottom-up" initiatives

Strategic instruments of institutional international collaboration

- International Max Planck Centers
  - Example **India (Delhi)**:
    Indo Max Planck for Center Computer Science, IIT Delhi
    - Top-quality basic research in Computer Science (CS)
    - Bridge between the Indian and German CS communities
    - Center of excellence for faculty and students career development
    - Various instruments applied: Partner Groups, Ph.D. students exchange, „Visiting Professorships"
- **International Max Planck CAS Partner Institute for Computational Biology (Shanghai)**
  - Combining efforts and expertise of top-class research institutes
  - Joint training of junior researchers
  - Close institutionalized links between CAS and MPG

How basic research generates innovation

Summary

- Curiosity driven research delivers the basis for breakthrough innovations
  = essential for knowledge based modern societies
- Attention has to be paid to better bridge the innovation gap
  = need for further technology transfer activities and funding
- International cooperation is essential to further strengthen the science and innovation system
  = expand internationalisation with big and small countries

Support Programmes

- KMU Innovativ / BioChance (BMBF)
  - For projects in the field of life sciences
- Additional funding programms "under construction" (BMBF)
- Exist Forschungstransfer (BMWI)
  - For all fields of technology
- Max Planck internal programms
  - For all fields of technology

Collaboration with Fraunhofer-Gesellschaft

Simulation models for industrial production (CMC®)

From biomass to fuel cell (ProBio)

- **Background**
  - Joint Initiative for Research and Innovation of Germany's federal and state governments
- **Focus**
  - Collaboration in areas of shared expertise and across disciplines
  - Application-related projects, new technologies
- **Realisation**
  - 19 projects since 2005
  - Expenses up to 2010: € 8.2 million
  - Duration: three years
  - Funding from the President's Strategic Innovation Fund

Live Science Incubator – caesar ("LSI")

The LSI is a pre-seed incubator to foster spin-offs from academic research organizations by providing

- Financing (up to € 1 million per group per year, for three years, follow up financing possible)
- 1st class infrastructure
- Professional support
  - Writing the business plan
  - Project management
  - General administration
  - Getting experienced managers
- Support in follow-on financing rounds

Lead Discovery Center ("LDC")

- The Team of the LDC is developing the pharmaceutical candidate molecules up to the proof of concept in animal models ("leads")
- The LDC integrates biology, medicinal chemistry and pharmacology with a professional management, resulting in a fully integrated platform
- The LDC applies the latest criteria from pharmaceutical industries ("big pharma") and works in close collaboration with the Max Planck Institutes

LDC – Part of a Concept

- The LDC is part of a concept for a *Drug Discovery and Development Center ("DDC")*
- The DDC comprises two independent companies:
  - The Lead Discovery Center (LDC) and
  - The Development Company (DevCo)
- DevCo will – as a free competitor with other companies – license the pharmaceutical candidates generated by the LDC.
- DevCo's purpose:
  - To carry out further steps in the development of new and innovative drug candidates
  - Initiate early clinical studies on patients

Honorary Speaker: Ernst Burgbacher, State Secretary, Federal Ministry of Economics and Technology (BMWi)

Mr. Burgbacher emphasized that public support for innovation and entrepreneurship should focus on creating appropriate framework conditions. He focused on education, public research institutions, regulations and a reliable IPR system. According to Burgbacher, state support should be used only in cases of market failure. The measures of economic policy should be designed in a way that keeps them from hampering the allocative mechanisms of the market.

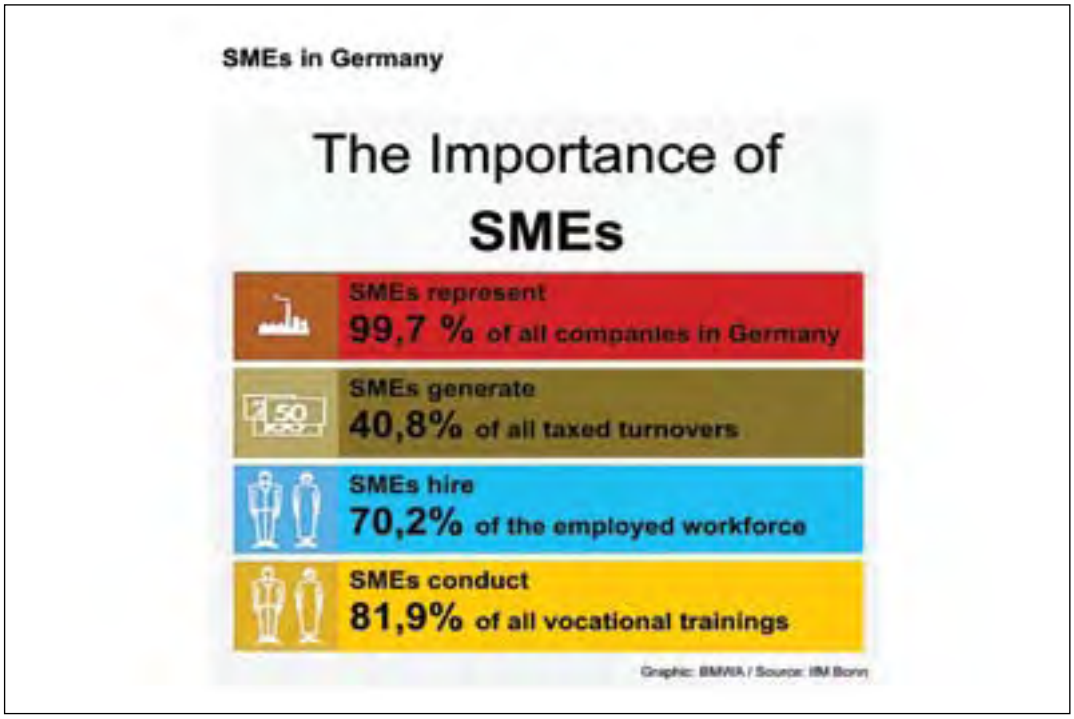
Plenary VIII: From Innovative Ideas to Successful Mittelstand Companies

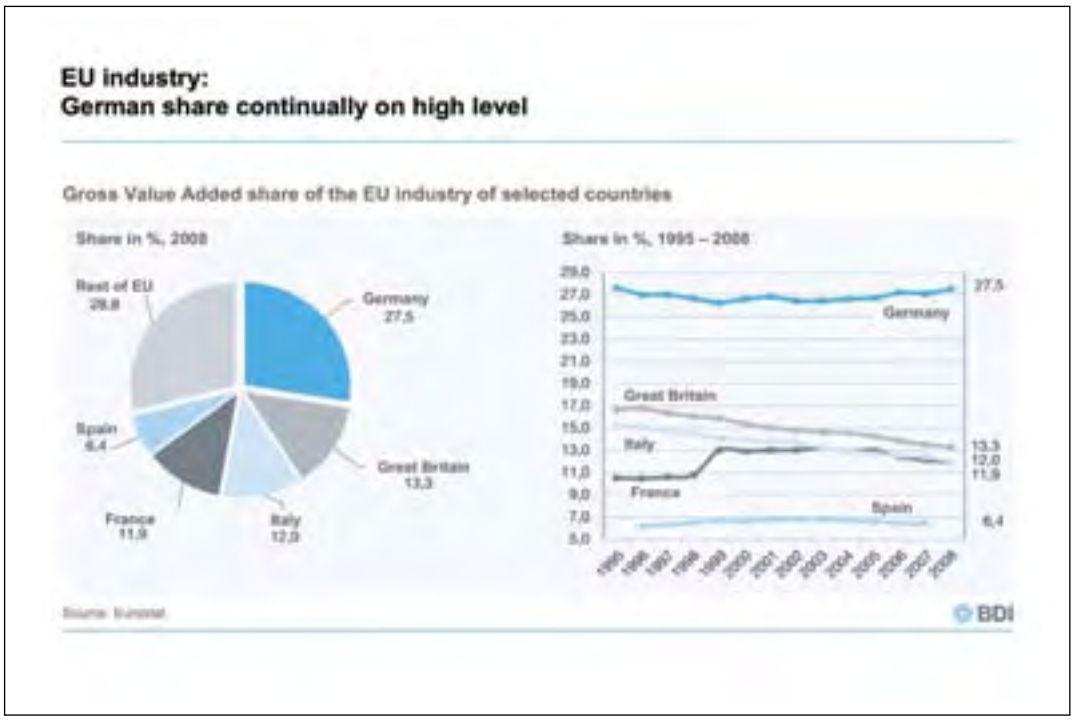
Internationally competitive companies are the key element of a dynamic and sustainably growing economy. But what are the main characteristics of these companies? How do they succeed on the global market? And how do they evolve from innovative start-ups to successful companies? This plenary, addressed these questions, discussing what kind of political environment and support schemes are most favorable to promoting innovative companies.
In Germany, the so-called "Mittelstand" represents a unique success story of companies. Mr. Kirchhoff, CEO of a very successful "Mittelstand" company and member/chairman of many in-ternational advisory groups dealing with SMEs issues, shared his experience. He explained key elements and characteristics that have enabled his company to succeed on the global market. Thereafter, Mr. Lindner, chairman of the German Committee on Eastern European Economic Relations, focused on the importance of linking education, research and corporate practices in order to turn innovative ideas into successful products.

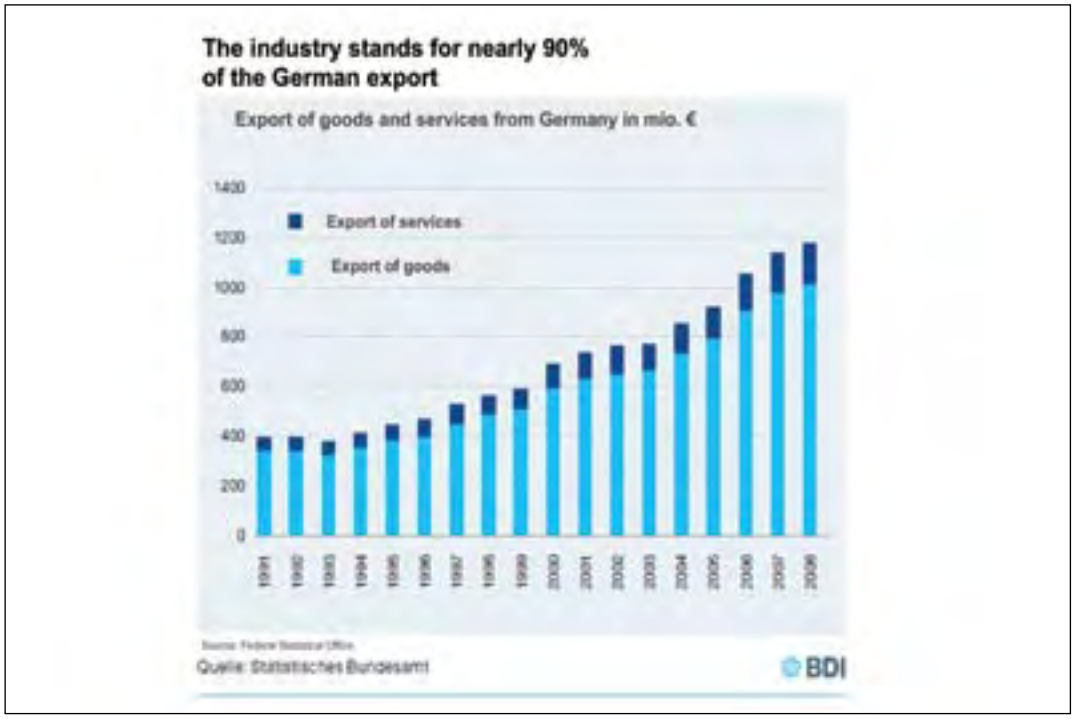
Sharing Experience of Mittelstand Companies

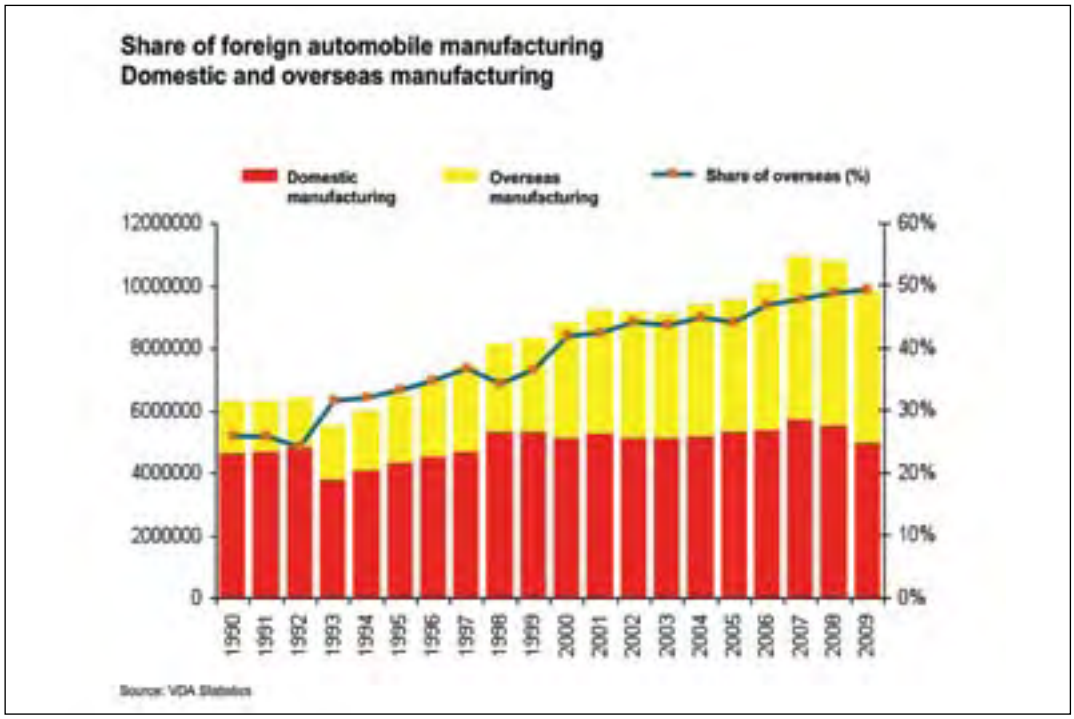
Arndt Kirchhoff, CEO, Kirchhoff Group
K.Rinscheid@kirchhoff-gruppe.de

Arndt Kirchhoff stated that processes of both value creation and innovation are performed within networks. He concluded that clusters (consisting of companies, universities and political decision makers) play an important role in the economic development of a companies and regions/countries. Kirchhoff stated that it could be helpful for Central and Eastern Europe (CEE) countries to attract relatively big companies, since they are key to necessary suppliers that might follow the big companies.


SMEs in Germany
The Importance of
SMEs
SMEs represent
99,7 % of all companies in Germany
SMEs generate
40,8% of all taxed turnovers
SMEs hire
70,2% of the employed workforce
SMEs conduct
81,9% of all vocational trainings
Graphic: BMWA / Source: IfM Bonn


EU industry:
German share continually on high level
Gross Value Added share of the EU industry of selected countries
Share in %, 2008
Rest of EU
28,8
Germany
27,5
Great Britain
13,3
Italy
12,0
France
11,9
Spain
6,4
Share in %, 1995 – 2008
Germany
Great Britain
Italy
France
Spain
27,5
13,3
12,0
11,9
6,4
BDI


The industry stands for nearly 90%
of the German export
Export of goods and services from Germany in mio. €
Export of services
Export of goods
1400
1200
1000
800
600
400
200
0
Quelle: Statistisches Bundesamt
BDI


Share of foreign automobile manufacturing
Domestic and overseas manufacturing
Domestic manufacturing
Overseas manufacturing
Share of overseas (%)
12000000
10000000
8000000
6000000
4000000
2000000
0
60%
50%
40%
30%
20%
10%
0%
1990
1991
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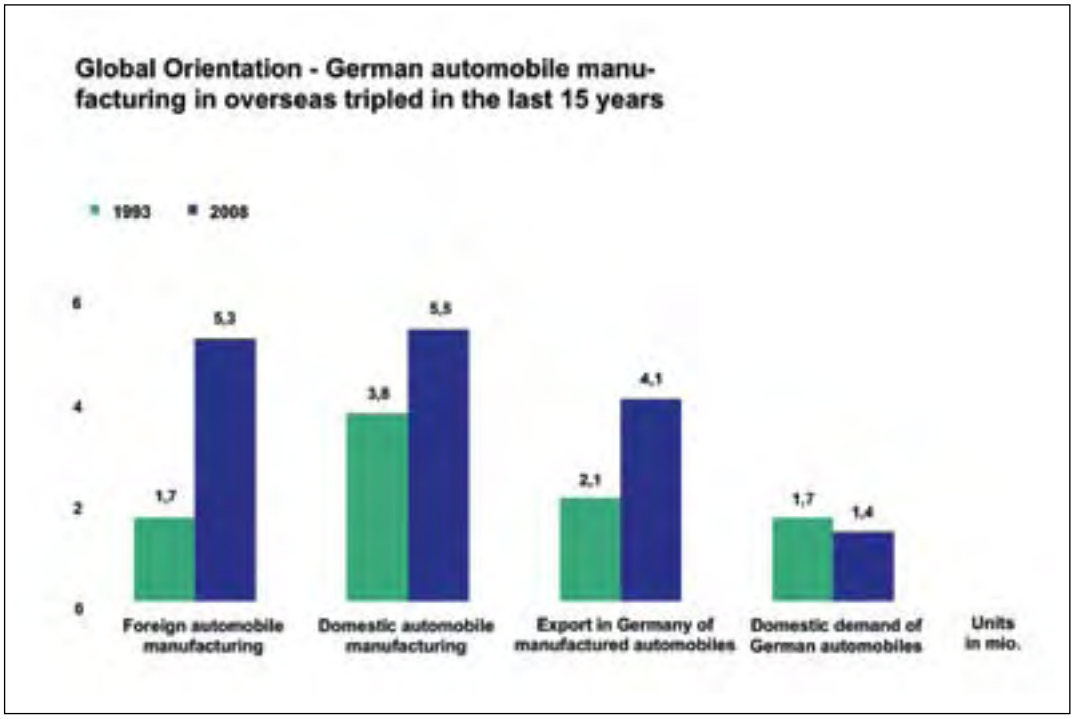
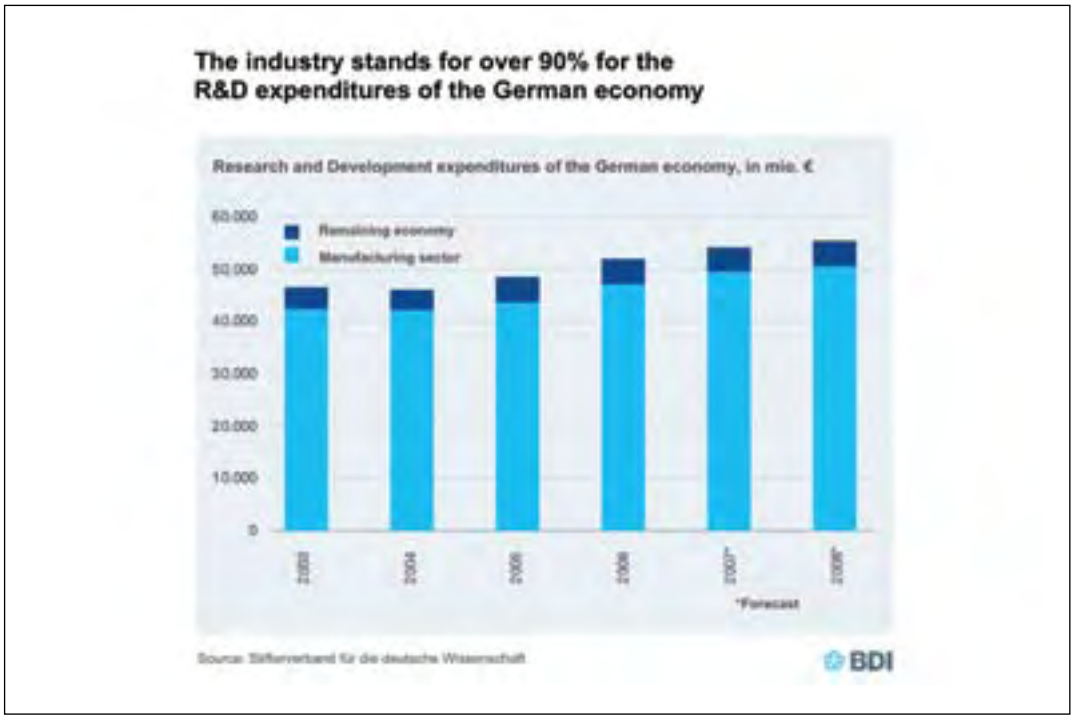
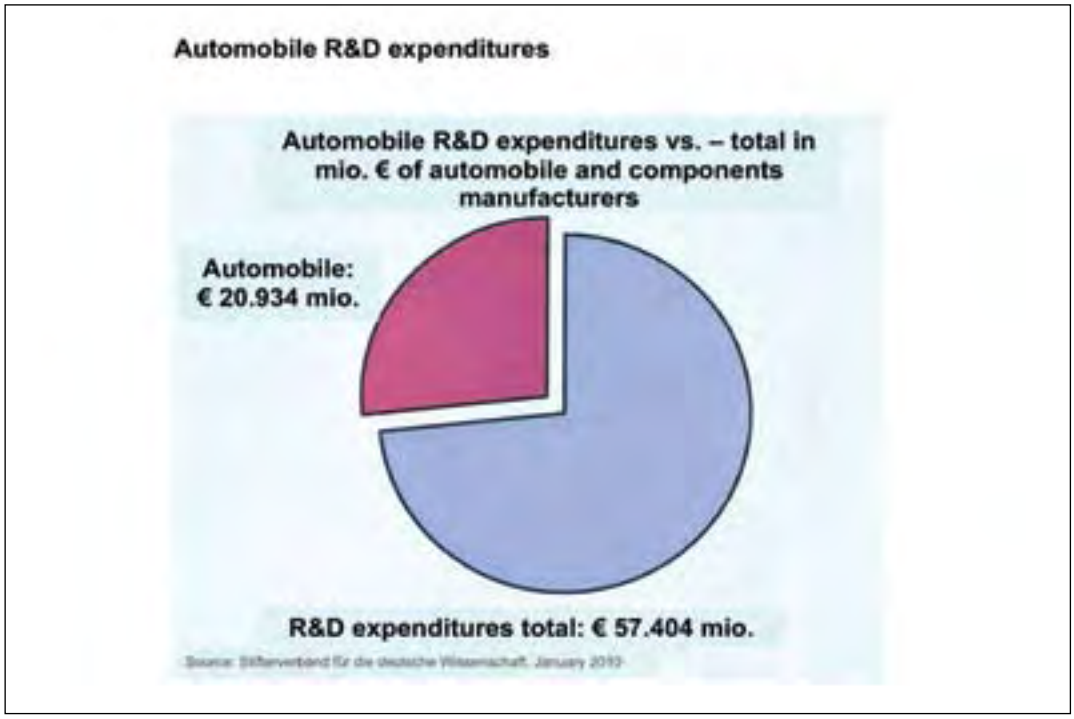
2008
2009
Source: VDA Statistics


Global Orientation - German automobile manufacturing in overseas tripled in the last 15 years
1993
2008
6
4
2
0
1,7
5,3
3,8
5,5
2,1
4,1
1,7
1,4
Foreign automobile manufacturing
Domestic automobile manufacturing
Export in Germany of manufactured automobiles
Domestic demand of German automobiles
Units in mio.


The industry stands for over 90% for the R&D expenditures of the German economy
Research and Development expenditures of the German economy, in mio. €
60.000
50.000
40.000
30.000
20.000
10.000
0
Remaining economy
Manufacturing sector
*Forecast
BDI

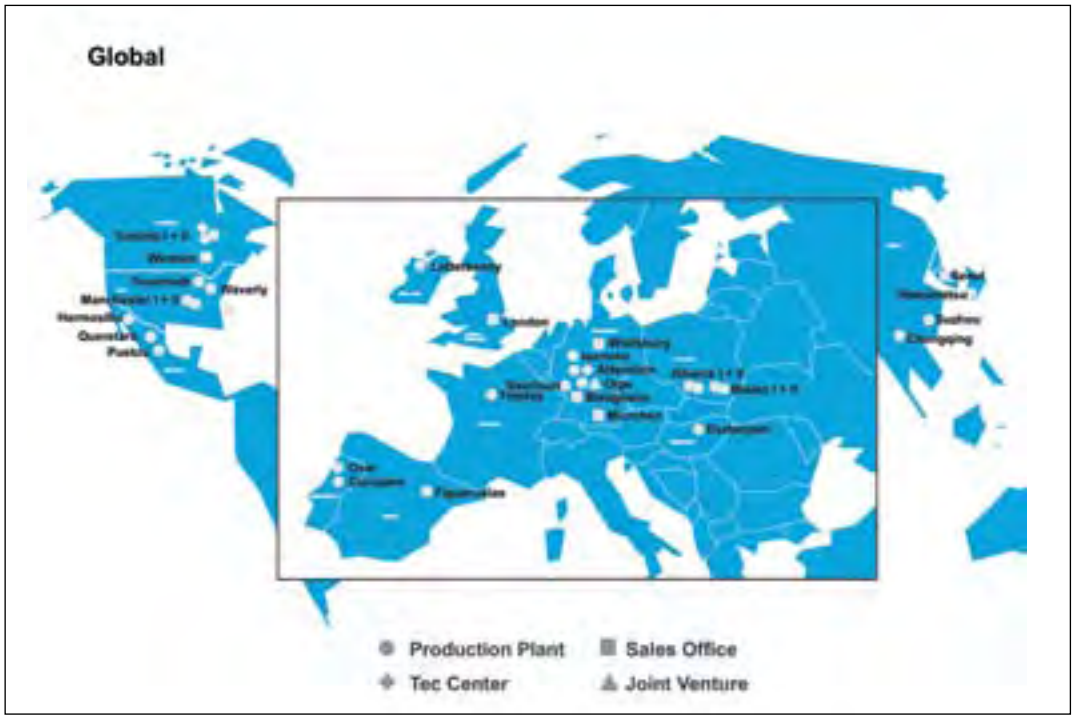

Automobile R&D expenditures
Automobile R&D expenditures vs. – total in mio. € of automobile and components manufacturers
Automobile:
€ 20.934 mio.
R&D expenditures total: € 57.404 mio.

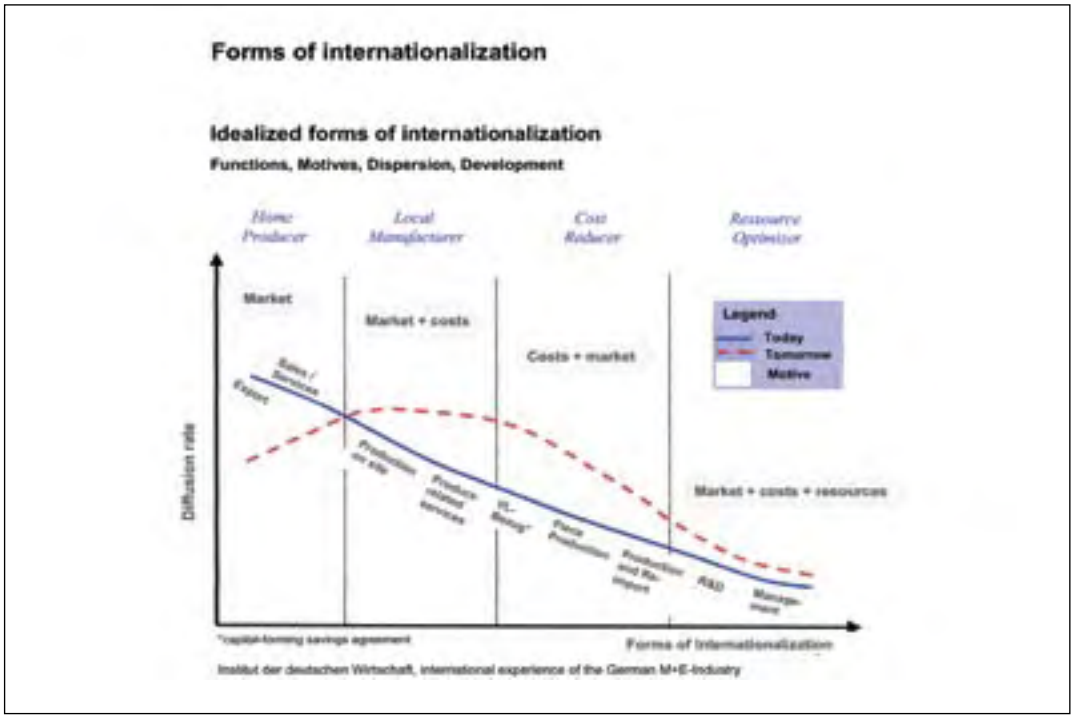

When function and effect are in harmony.
Handtools from WITTE.
WITTE

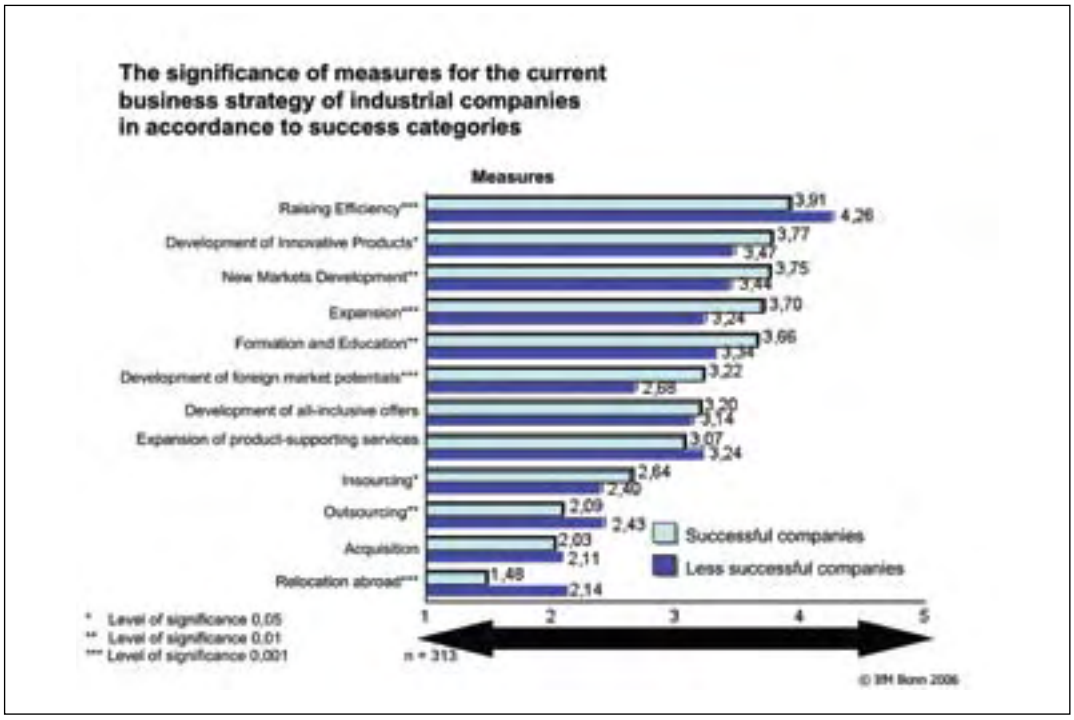

Fair balance is the ultimate benchmark.
Waste disposal vehicles and logistic concepts of FAUN.
Rear loader
Side loader
Front loader
Front side loader
ONE STOP
Sewage cleaner
Lifter
Street sweeper
MSTS


Fascination of individual mobility.
Tailormade cars for handicapped people.
Driving aid
Boarding aid
Loading aid
Ramp lift
Rear entry


KIRCHHOFF Automotive.
Structure and Stability
through intrinsic values.
Technology,
that gets under the skin.

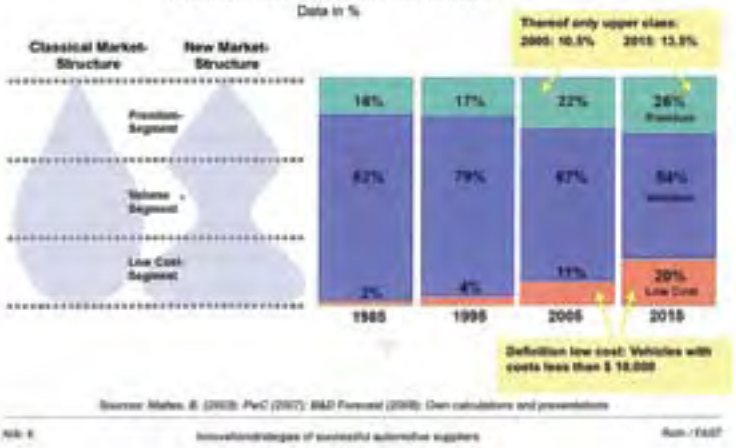

Global
Production Plant
Sales Office
Tec Center
Joint Venture


Forms of internationalization
Idealized forms of internationalization
Functions, Motives, Dispersion, Development
Home Producer
Local Manufacturer
Cost Reducer
Resource Optimizer
Market
Market + costs
Costs + market
Market + costs + resources
Legend
Today
Tomorrow
Motive
Diffusion rate
Forms of Internationalization
Institut der deutschen Wirtschaft, international experience of the German M+E-Industry

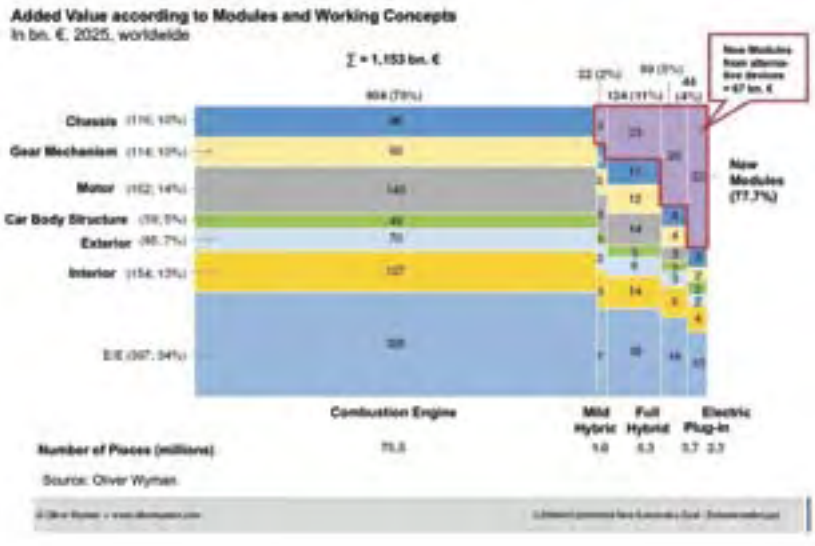

The significance of measures for the current business strategy of industrial companies in accordance to success categories
Measures
Raising Efficiency***
3,91
4,26
Development of Innovative Products*
3,77
3,47
New Markets Development**
3,75
3,44
Expansion***
3,70
3,24
Formation and Education**
3,66
3,24
Development of foreign market potentials***
3,22
2,68
Development of all-inclusive offers
3,20
3,14
Expansion of product-supporting services
3,07
3,24
Insourcing*
2,64
2,40
Outsourcing**
2,09
2,43
Acquisition
2,03
2,11
Relocation abroad***
1,48
2,14
Successful companies
Less successful companies
1
2
3
4
5
* Level of significance 0,05
** Level of significance 0,01
*** Level of significance 0,001
n = 313
© IW Bonn 2006

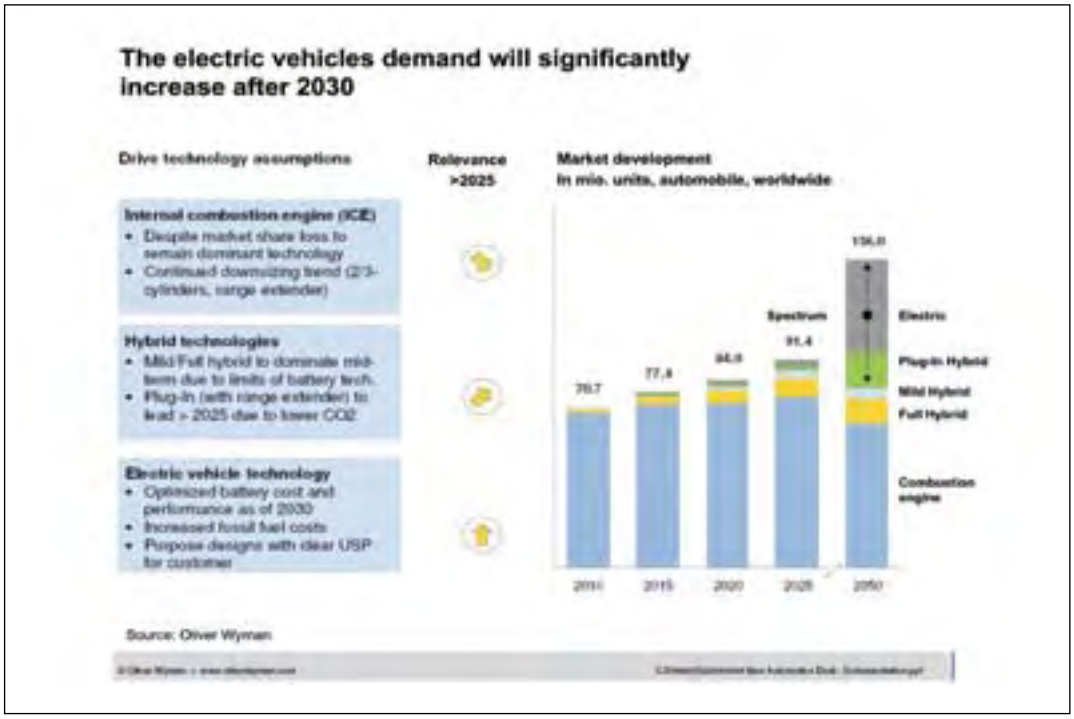
Polarization of the automobile markets

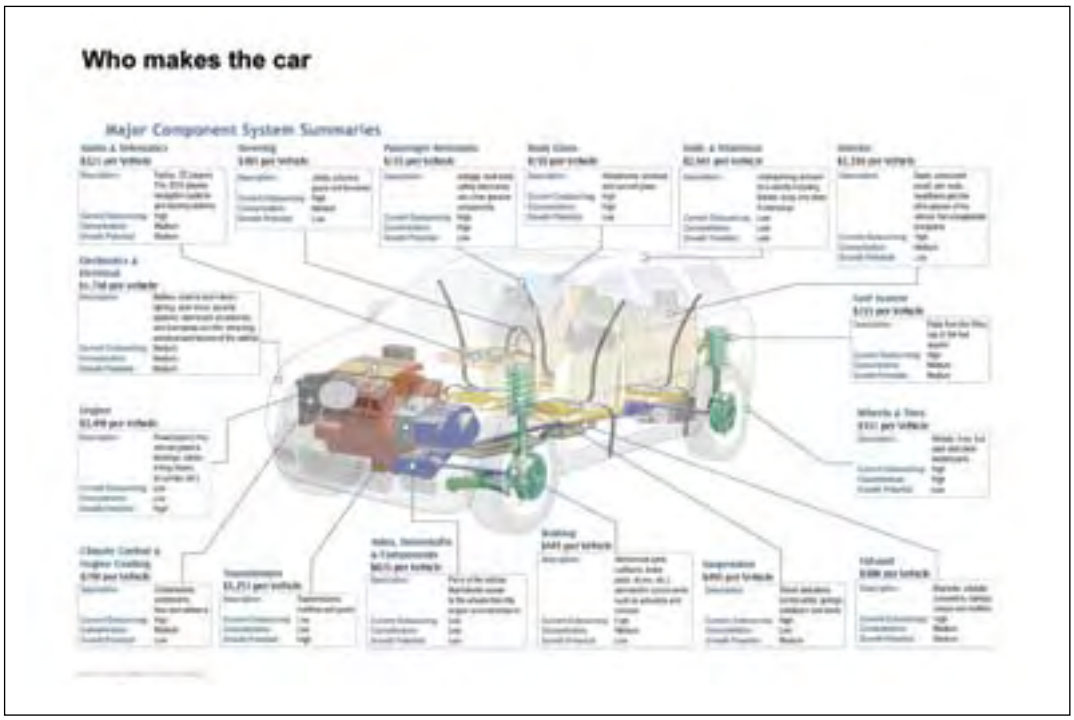
The polarization of automobile-markets follows income-structures: Downturn of the middle segments in favour of Premium and Low-Cost



The financial crisis will accelerate the development of new competencies in the area of alternative drive systems € 67 billion added value with new modules



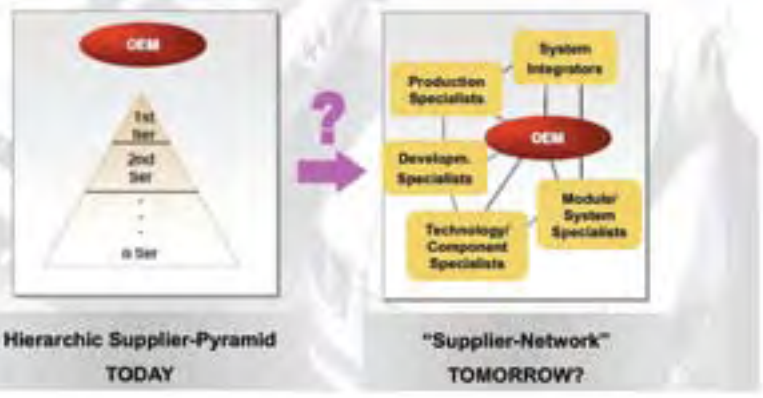

The electric vehicles demand will significantly increase after 2030
Drive technology assumptions
Relevance >2025
Market development in mio. units, automobile, worldwide
Internal combustion engine (ICE)
• Despite market share loss to remain dominant technology
• Continued downsizing trend (2/3-cylinders, range extender)
Hybrid technologies
• Mild/Full hybrid to dominate mid-term due to limits of battery tech.
• Plug-in (with range extender) to lead > 2025 due to lower CO2
Electric vehicle technology
• Optimized battery cost and performance as of 2030
• Increased fossil fuel costs
• Purpose designs with clear USP for customer
Spectrum
91.4
Electric
Plug-in Hybrid
Mild Hybrid
Full Hybrid
Combustion engine
2015
2020
2025
2050
Source: Oliver Wyman


Who makes the car
Major Component System Summaries

Who makes the car Major Component System Summaries	US $/Vehicle	%
Audio & Telematics	325	2,34
Steering	385	2,77
Passenger Restraints	355	2,55
Body Glass	150	1,08
Body & Structural	2.445	17,59
Interior	1.330	9,57
Fuel System	355	2,55
Wheels & Tires	355	2,55
Exhaust	300	2,16
Suspension	495	3,56
Braking	445	3,20
Axles, Driveshafts & Components	835	6,01
Transmission	1.255	9,03
Climate Control & Engine Cooling	710	5,11
Engine	2.410	17,34
Electrics & Electrical	1.750	12,59
	13.900	100%

New structures of added value are required

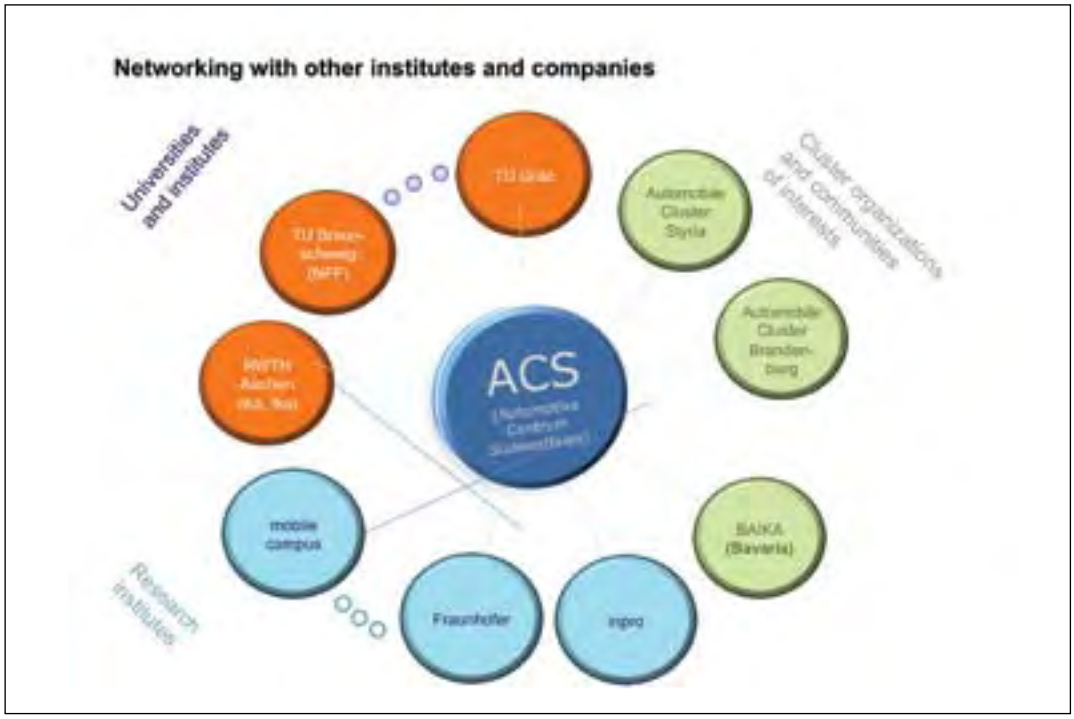
The increasing complexity of development has to be addressed with new structures of added value outside the OEM



Clustermanagement NRW

www.autocluster.nrw.de

Electric Mobility RWTH


Networking with other institutes and companies
Universities and institutes
TU Braunschweig (WFF)
Automobile Cluster Styria
Cluster organizations and communities of interests
Automobile Cluster Brandenburg
ACS
mobile campus
SAXA (Saxeria)
Research institutes
Fraunhofer
inpro


VIA – Association of innovative automotive suppliers.
VIA Consult
Head office Olpe/Biggesee
Founded 2001
Employees 8
• Business and division organization
• Process organization and optimization
• Improve business performance
• Initiation of new technologies
• Restructuring (Change Management)
• Initiation of new management systems
Partner of VIA Consult:
TÜV Akademie
agiplan
• Cooperation management
• Benchmarking
• Mentoring of cross company working groups
• Creation of purchasing pools
VIA Oberflächentechnik
Head office
Lennestadt-Grevenbrück
Founded
1996
Employess
72
VIA Laser- und Systemtechnik
Head office
Suhl
Founded
1999
Employees
35
VIA Lasertec
Head office
Lennestadt-Würdinghausen
Founded
1999
Employees
24

Opportunities and Recommendations

Increase activities in foreign countries

25% export, but only 3% invest (all companies)

Cooperation and networking (Cluster)

Utilisation of Resources at Non-Core-Business
Bundle activities in education and innovation
(see example VIA: www.v-i-a.de)

Economic Ties between Germany and Central and Eastern Europe: Basis for Innovative SMEs

Prof. Dr. Rainer Lindner, CEO, Committee on Eastern European Economic Relations, Germany
r.lindner@bdi.eu

Rainer Lindner stated that the Central and Eastern European countries constitute important export destinations for German companies (in 2009, CEE accounted for 16% of German foreign trade). Focusing on Russia, Lindner referred to the Russian government's modernization strategy. One outcome of this strategy is the INNOGRAD project. INNOGRAD is a technology park that is going to be established near Moscow. According to Lindner, the top-down approach of the project could hamper the development of this technology park. However, since the management of INNOGRAD is performed by businessmen instead of civil servants, this problem might be overcome.

The Committee on Eastern European Economic Relations (OA):

-Founded in 1952 at the height of the Cold War
-German business' oldest "regional initiative"
- More than 150 member companies and associations
- Chairman of the Board: Prof. Dr. Klaus Mangold
- Seat of secretariat in Berlin with 20 members of staff

Responsible for the regions:
Russia, Belarus, Ukraine, Southeastern Europe, Central Asia and Caucasus

Der Ost-Ausschuss...

- Flanks and promotes German companies' activities
- Focuses and represents the country-specific interests of German business in Germany and in the 22 target countries
- Represents German business in bilateral bodies
- Organises delegation visits, conferences, background talks and events with government representatives and entrepreneurs
- Provides a network of contacts and up-to-date information on economic developments in the target countries
- Supports the development of the Eastern European market economies through advisory and stipend programmes
- Promotes scientific and civil society dialogue

Importance of German trade with the CEE region

- In 2009 Germany traded goods with CEE totalling EUR 234 billion (OA countries: EUR 95 billion)
- In 2009 the total CEE region generated 16 percent of foreign trade (USA: 6.5 percent)

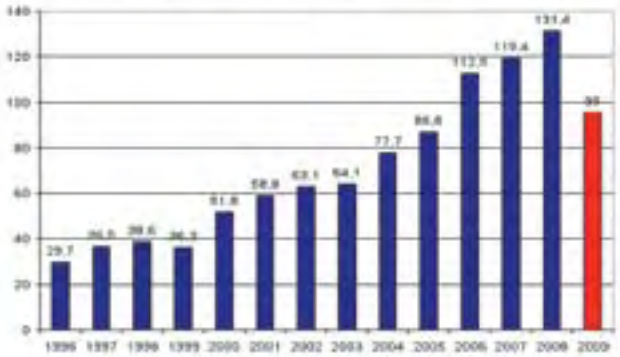


Chart:
Development of trade with the 22 OA countries since 1996

EUR billion. Sources: Committee on Eastern European Economic Relations, Federal Statistical Office

CEE: Great need to catch up as regards hi-tech

Germany obtains its raw materials and products with low real net output ratio mainly from CEE. Eastern Europe is not a well-developed location for hi-tech research and development

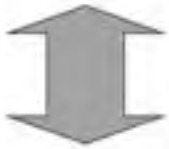
Shares of internationally registered patents in the field of international hi-tech industry (OECD 2008):

USA: 36.5%
Japan: 15.9%
Germany: 9%
Rest of the world: 38.6%

Russia's share is a little more than 0% and only in the sub-areas nanotechnology (0.5%) and nuclear technology (3%)

Linking education, research and corporate practice

Excellent basic research in Central and Eastern Europe / Good basic training for skilled workers



- Research should be more industrial-applications oriented (Model: Fraunhofer)
- Cluster formation: start-up centres at universities / incubators / Venture Capital (Silicon Valley / Innograd near Moscow)
- Promote innovative SMEs / tax breaks for research in private-sector companies
- Innovation begins with apprenticeship training: company-related training models / technical colleges

Innovation begins with apprenticeship training: Dual training and further training schemes

- On-the-job training and attending vocational schools in parallel ensures companies in Germany can develop personnel according to their needs (dual training scheme)
- Innovative and basic training structure / final examination
- State promotion of further education measures
- State promotion of business start-ups

Know-how Transfer through German investors

- Foreign investors enhance the innovation capacity of domestic economies: As there are no dual vocational training schemes in Eastern Europe German companies are developing their own training and further training schemes in the relevant countries

Training and further training of more than 70,000 construction workers and architects in nine training centres in Russia

Training in cooperation with local commercial schools since 2000. After great success in Poland, Russia and Romania extended to include the Czech Republic and Slovakia in 2008

„Science to Business" programme in Russia / Ukraine

Know-how Transfer through German Investors

MBA programme in cooperation with the FHTE Esslingen and the Moscow Power Engineering Institute

Suppliers for training and further training organisations Etablishment of learning systems for automisation technology and mechatronics at Eastern European universities and technical colleges

Since 2004 graduates from the Technical University and staff of dealer service-centres have qualified as skilled workers in the areas of service, diagnosis and repairs at the Daimler Automotive Academy Perm

Innovation for agriculture – Working Group on Agriculture in the OA

German Agricultural Centre in the Ukraine (DAZ)
(Tscherkasi area)

- Further training measures for specialists and management from the agriculture sector
- In the first year 2009 a total of 2000 participants attended the integrated training courses for the agricultural technology industry, the crop industry and pest control manufacturers
- Successful linking of industry, policy-makers, teaching and research
- Possible to increase crop yields by approx. 60 percent

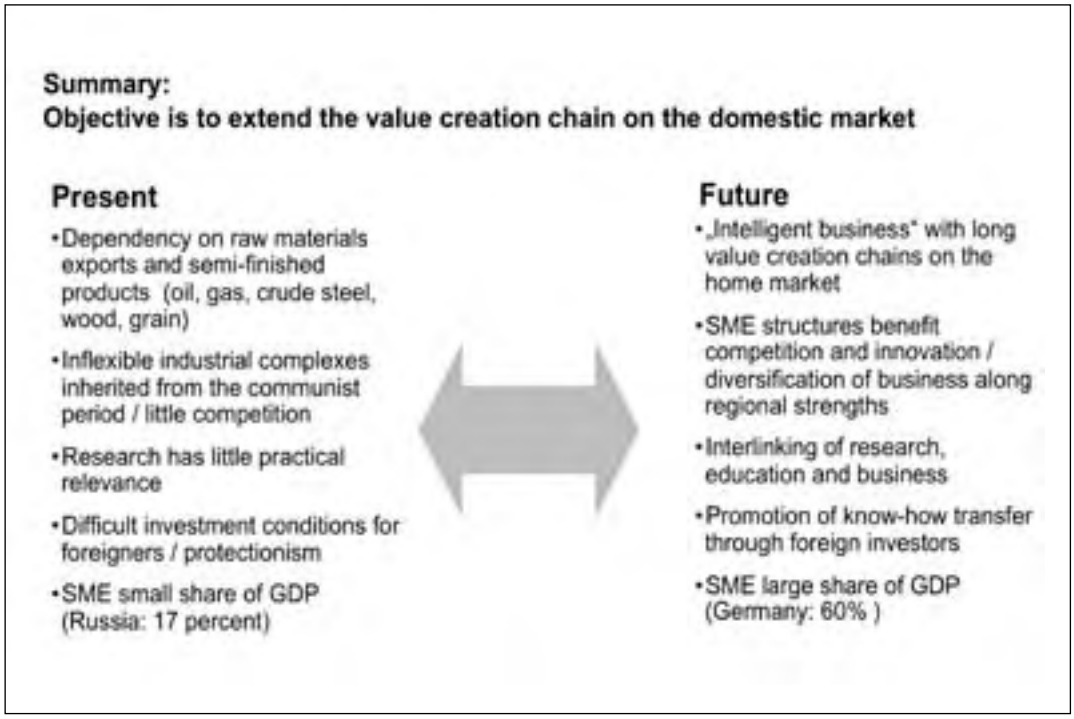
Project work of the Committee on Eastern European Economic Relations

Belarus / Moldova / Ukraine:
Promotion of private-sector structures

Belarus / Kasakhstan / Usbekistan:
Advanced management training

Russia:
German-Russian talks Baden-Baden /
Advanced engineering training

West Balkans:
German business' Zoran Djindjic Internship Programme for the West Balkans


Summary:
Objective is to extend the value creation chain on the domestic market
Present
•Dependency on raw materials exports and semi-finished products (oil, gas, crude steel, wood, grain)
•Inflexible industrial complexes inherited from the communist period / little competition
•Research has little practical relevance
•Difficult investment conditions for foreigners / protectionism
•SME small share of GDP (Russia: 17 percent)
Future
•„Intelligent business" with long value creation chains on the home market
•SME structures benefit competition and innovation / diversification of business along regional strengths
•Interlinking of research, education and business
•Promotion of know-how transfer through foreign investors
•SME large share of GDP (Germany: 60%)

Plenary IX: Climate Change and Innovation

Meeting climate change and development goals requires a significant stepping-up of international efforts to diffuse existing technologies and develop new ones. Public and private investment – now in the tens of billions of dollars per year – needs to be steeply ramped up to several hundreds of billions of dollars annually.

This panel examined pressing innovation and technology diffusion needs in ECA for climate change mitigation and adaptation. The rapidly growing role of climate change innovation in global competitiveness and possible entry points for ECA countries in this market were discussed.

Accelerating Diffusion and Innovation of Climate Change Systems

Jean Louis Racine, Private Sector Development Specialist, ECSPF, World Bank
jracine1@worldbank.org

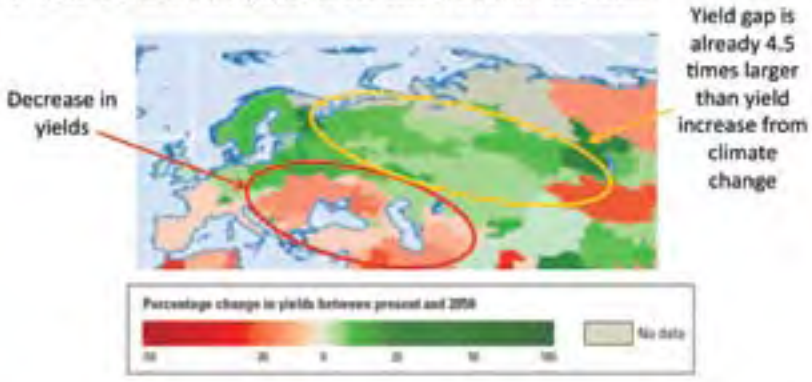
Mr. Racine's presentation concentrated on climate-smart innovation. He stated that this kind of innovation could help to mitigate and adapt to the impacts of climate change. Racine gave three reasons why ECA countries should focus on climate-smart innovation: First, adaption relies on local innovation. Second, win-win opportunities can be seized. Third, ECA countries should avoid being the last in the game. Regarding the stimulation of climate-smart innovation in ECA, Racine suggested two main measures: the implementation of regulations and mandatory performance standards as well as price signals. However, according to Racine, regulations and price signals alone cannot solve the market and system failures associated with innovation. It is also necessary to improve the business environment, to facilitate climate-smart FDI and create conditions for local production of climate-smart technologies, and to introduce climate-smart innovation policies.

WHAT IS CLIMATE-SMART INNOVATION?

Sector	Mitigation	Adaptation	Examples
Transport	√		Electric vehicles
Industry	√		Energy efficiency
Energy supply	√		Renewable energy
Waste management	√		Recovering/reducing methane from waste
Building	√	√	Storm-resistant buildings, energy efficiency
Agriculture	√	√	Drought resistant crops
Forestry	√	√	Processing and use of forest products
Human health		√	Health monitoring and surveillance systems
Coastal adaptation		√	Geographical planning systems for coastal zones
Water		√	Non-water based sanitation

WHY BOTHER WITH CLIMATE-SMART INNOVATION IN ECA?
-> REASON 1: ADAPTATION RELIES ON LOCAL INNOVATION

- Water availability is expected to decrease everywhere but Russia

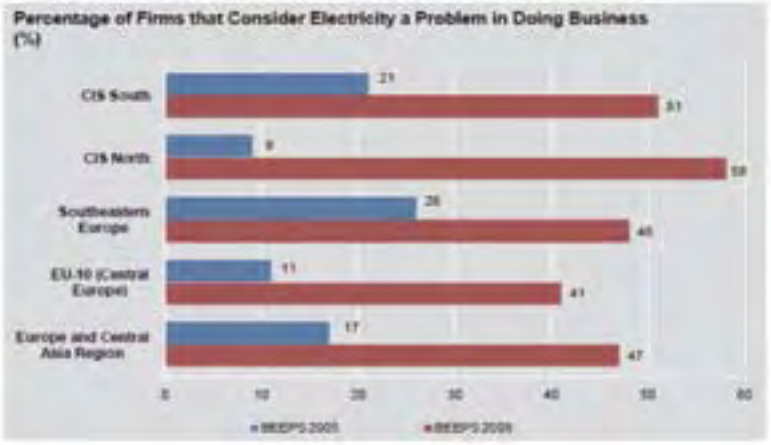


- ECA's poor transport, power and housing infrastructure is expected to be under significant stress

Source: World Bank (2009) World Development Report 2010

WHY BOTHER WITH CLIMATE-SMART INNOVATION IN ECA?
-> REASON 2: THERE ARE WIN-WIN OPPORTUNITIES

- Energy technology can promote business competitiveness



Source: World Bank (2010) Lights Out? The Outlook for Energy in Eastern Europe and the Former Soviet Union

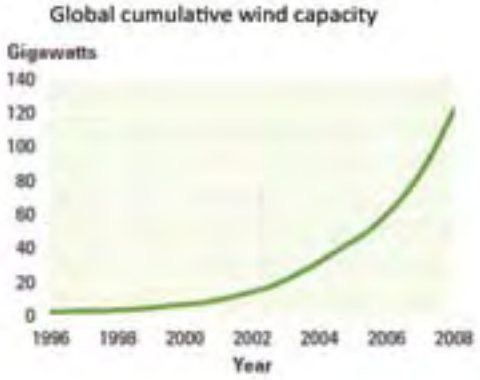
WHY BOTHER WITH CLIMATE-SMART INNOVATION IN ECA?
-> REASON 2: THERE ARE WIN-WIN OPPORTUNITIES

- Many climate change technologies are already financial viable

Source: World Bank (2009) World Development Report 2010

WHY BOTHER WITH CLIMATE-SMART INNOVATION IN ECA?
-> REASON 3: DON'T BE THE LAST ONE IN THE GAME

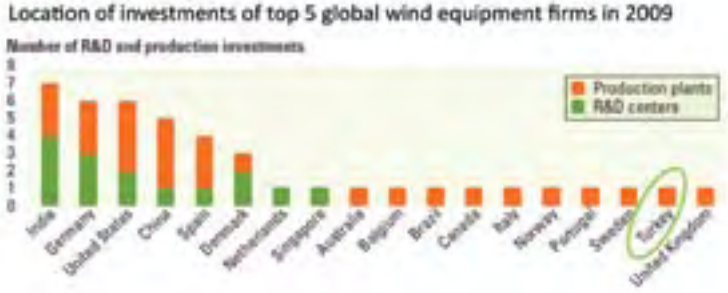
- Clean technology investments are experiencing phenomenal growth



Source: World Bank (2009) World Development Report 2010

WHY BOTHER WITH CLIMATE-SMART INNOVATION IN ECA?
-> REASON 3: DON'T BE THE LAST ONE IN THE GAME

- But where is ECA?

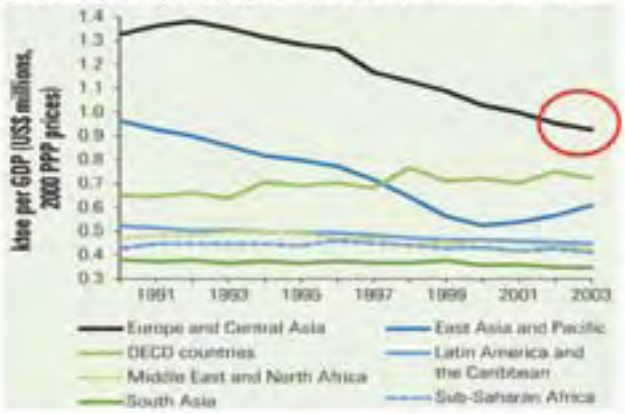


Source: World Bank (2009) World Development Report 2010

WHY BOTHER WITH CLIMATE-SMART INNOVATION IN ECA?
-> REASON 3: DON'T BE THE LAST ONE IN THE GAME

- ECA has the world's highest carbon intensity

Total primary energy supply in kiloton oil equivalent per GDP



Source: World Bank (2010) Lights Out? The Outlook for Energy in Eastern Europe and the Former Soviet Union

HOW CAN YOU STIMULATE CLIMATE-SMART INNOVATION IN ECA?

- Command and control:
  - Regulations and mandatory performance standards
  - ...but careful, this is a double-edged sword

How can you stimulate Climate-Smart Innovation in ECA?

- Price signals
  - Remove subsidies to high-carbon technologies
  - Remove tariffs on climate-smart technologies
  - Tax carbon
  - Introduce feed-in tariffs for renewable energy

How can you stimulate Climate-Smart Innovation in ECA?

- Regulation and price signals in action in China

Number of electric bicycles produced in China:

1998 = 40,000

2008 = 21,000,000

($11 billion industry)

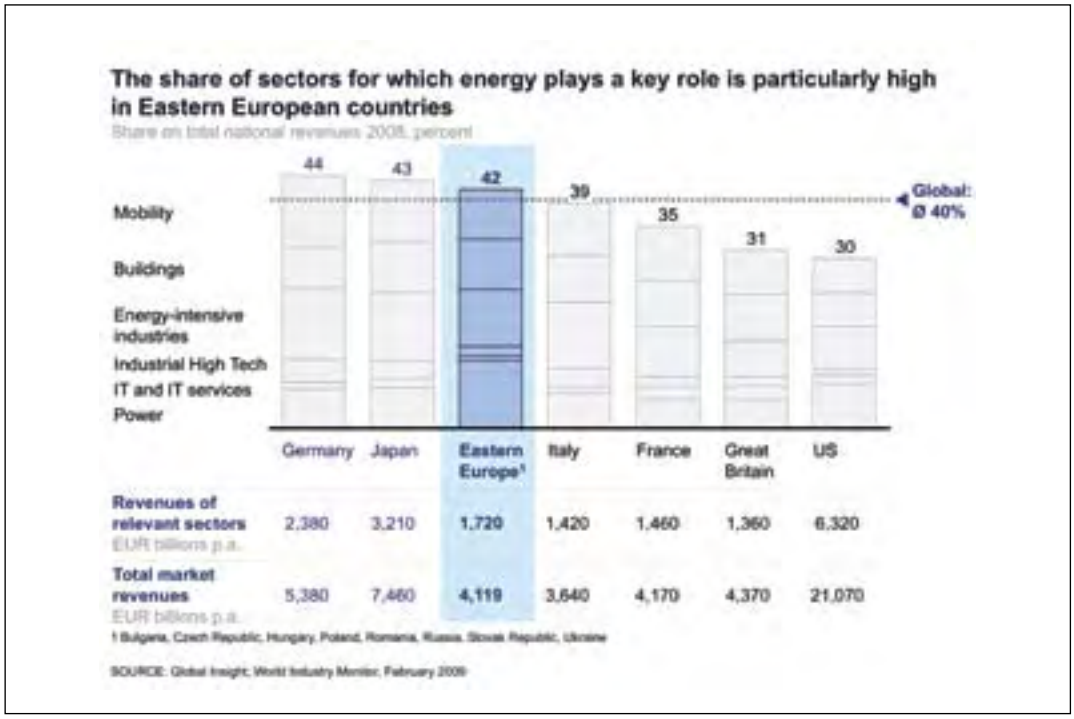
Source: World Bank (2009) World Development Report 2010

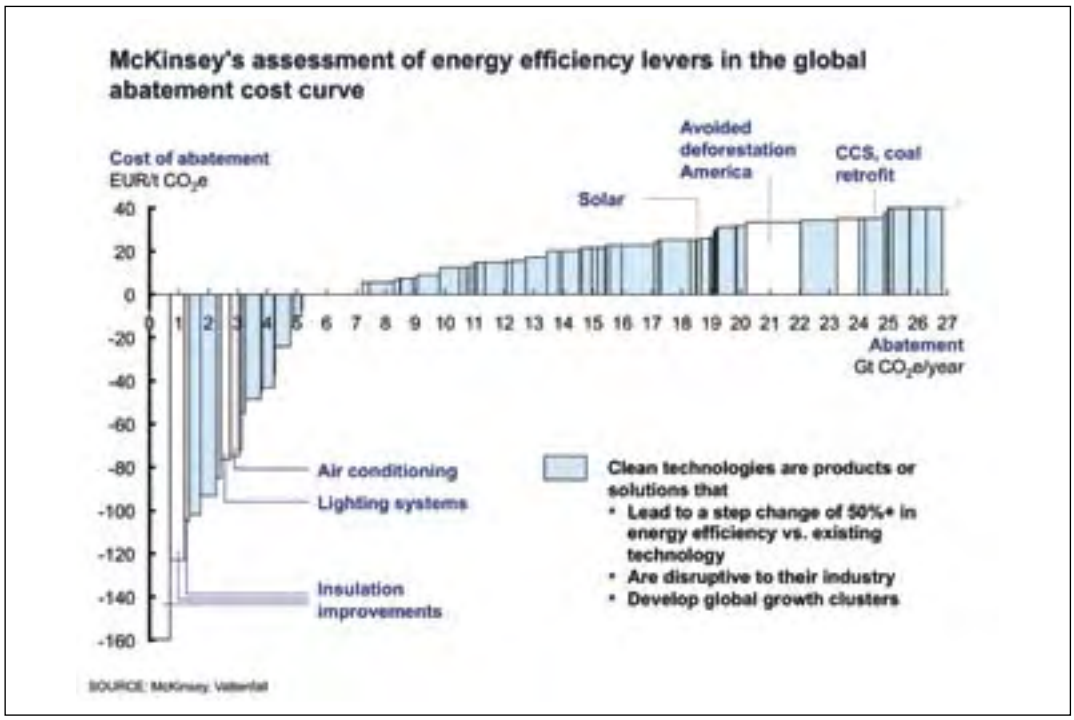

HOW CAN YOU STIMULATE CLIMATE-SMART INNOVATION IN ECA?
But regulations and price signals alone can't solve the market and system failures associated with innovation
Improve the business environment
Facilitate climate-smart FDI and create conditions for local production of climate-smart technologies
Introduce climate-smart innovation policy
Public R&D on climate-smart innovation
Research-industry linkages
Climate-smart industry standards
Climate-smart technology extension programs in industry and agriculture
In countries with a critical mass of innovation such as Russia, Poland and Turkey, introduce climate-smart innovation support promotion instruments in the private sector: matching grants, innovation prizes, etc.

The Energy Opportunity

Florian Weig, Principal, Munich office and leader of the Europe, Middle East, and Africa, High-Tech Practice, McKinsey & Company
Florian_Weig@MCKINSEY.COM

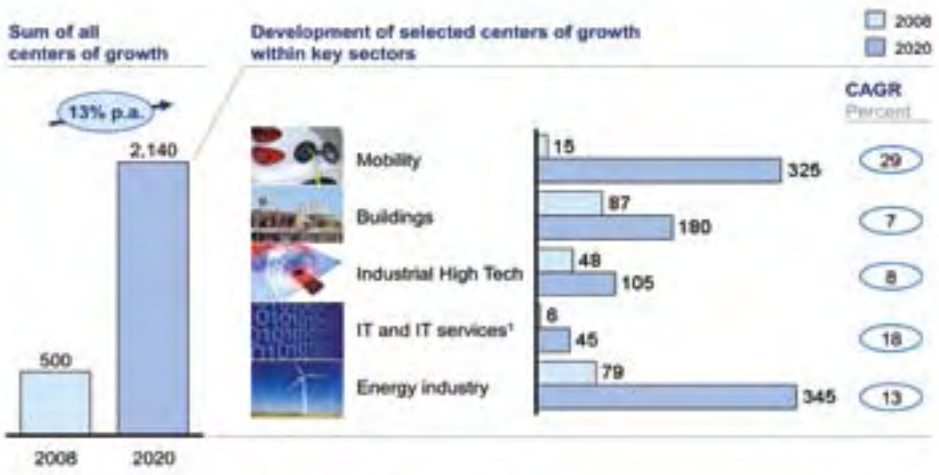
Dr. Florian Weig stated that the share of sectors for which energy plays a key role was particularly high in Eastern European countries. According to Weig, clean-tech solutions (e.g. mobility, buildings, industrial high-tech, IT and IT services, energy) could develop a global market potential of €2 trillion by 2020. The main drivers for growth in clean-tech industries are increasing energy costs, a concentration in the delivery of oil and gas as well as regulations for climate protection. A radical customer orientation and new business models are essential preconditions to realize the market potential. Weig identified three advantages for clean-tech in the ECA region: First of all, the high energy dependency of ECA industries makes them the perfect breeding and testing ground for many clean-tech applications. Secondly, the strong R&D and engineering culture provides a strong innovation base. Thirdly, established partnerships in many clean-tech industries allow quick access to know-how.


The share of sectors for which energy plays a key role is particularly high in Eastern European countries
Share on total national revenues 2008, percent
44
43
42
39
35
31
30
Global: Ø 40%
Mobility
Buildings
Energy-intensive industries
Industrial High Tech
IT and IT services
Power
Germany
Japan
Eastern Europe¹
Italy
France
Great Britain
US
Revenues of relevant sectors
EUR billions p.a.
2,380
3,210
1,720
1,420
1,460
1,360
6,320
Total market revenues
EUR billions p.a.
5,380
7,460
4,119
3,640
4,170
4,370
21,070
1 Bulgaria, Czech Republic, Hungary, Poland, Romania, Russia, Slovak Republic, Ukraine
SOURCE: Global Insight; World Industry Monitor, February 2009


McKinsey's assessment of energy efficiency levers in the global abatement cost curve
Cost of abatement
EUR/t CO2e
Avoided deforestation America
CCS, coal retrofit
Solar
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
Abatement
Gt CO2e/year
Air conditioning
Lighting systems
Insulation improvements
Clean technologies are products or solutions that
• Lead to a step change of 50%+ in energy efficiency vs. existing technology
• Are disruptive to their industry
• Develop global growth clusters
SOURCE: McKinsey; Vattenfall

Cleantech centers of growth are developing a global market potential of EUR 2 trillion in 2020

EUR billions p.a.



1 Include energy-efficient IT, IT for energy management, smart grid, IT based traffic systems

SOURCE: McKinsey report, "Wettbewerbsfaktor Energie"

Radical customer orientation and new business models key to realizing market potential

Mindset of radical customer focus to bring energy-efficient products to scale

Adapt application to meet customer needs precisely

Cater business and financing models to customers

Raise customer awareness of TCO benefit[2]

Main levers

A **Design-to-value**, e.g., cogeneration solution to reuse rejected paper

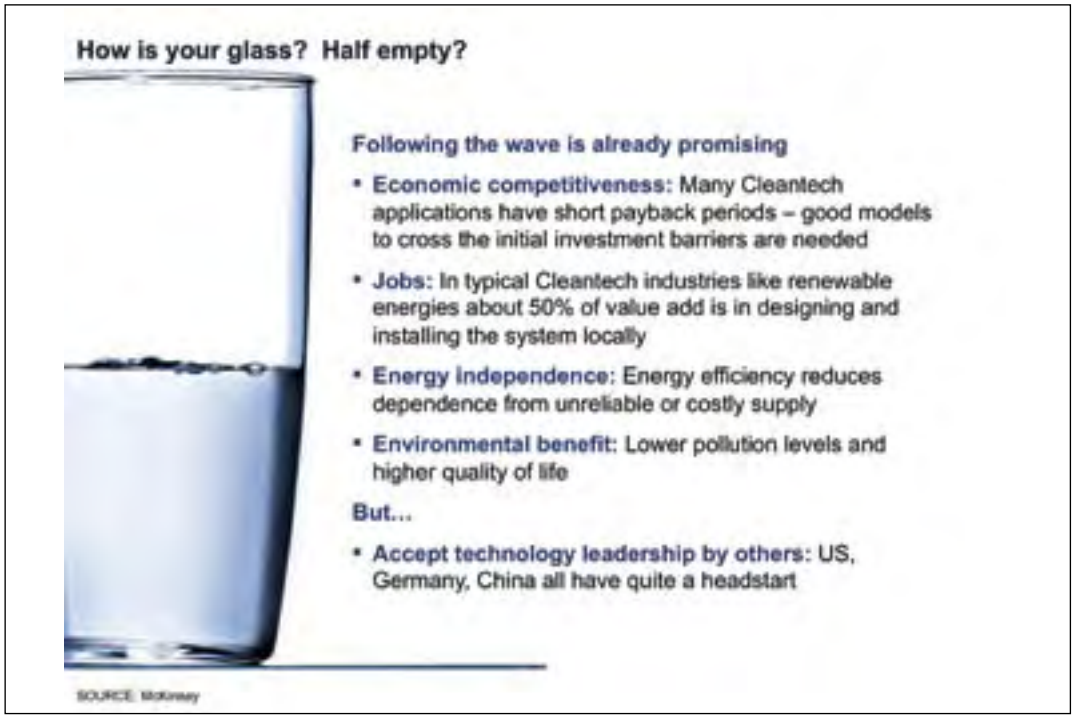
B **Design-to-cost**, e.g., using less costly components in CHP[1] systems for residential customers

C **Financing models**, e.g., rate payment models for energy-efficient consumer products

D **Business model transformation**, e.g., energy contracting solutions for buildings

E **Value-selling**, e.g., clearly defining and communicating value to the customer and offer alternative operating/financing models

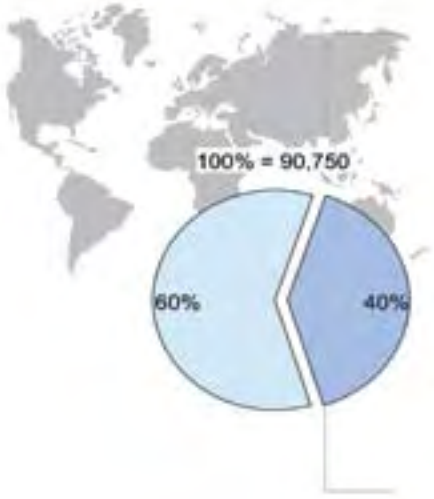
1 Combined heat and power
2 Total cost of ownership

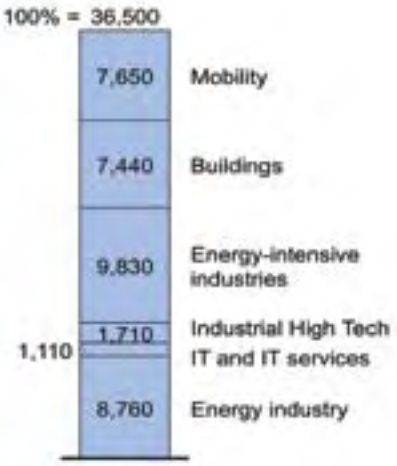

How is your glass? Half empty?
Following the wave is already promising
• Economic competitiveness: Many Cleantech applications have short payback periods – good models to cross the initial investment barriers are needed
• Jobs: In typical Cleantech industries like renewable energies about 50% of value add is in designing and installing the system locally
• Energy independence: Energy efficiency reduces dependence from unreliable or costly supply
• Environmental benefit: Lower pollution levels and higher quality of life
But...
• Accept technology leadership by others: US, Germany, China all have quite a headstart
SOURCE: McKinsey


How is your glass? Half full!
Surfing the wave leads to real opportunity
• Still emerging opportunities: Most Cleantech markets have no established industry structure and are expanding constantly; no single technology or business model winning so far
• ECA advantage 1: High energy dependency of ECA industries makes them the perfect breeding and testing ground for many Cleantech applications
• ECA advantage 2: Strong R&D and engineering culture providing a strong innovation base
• ECA advantage 3: Established partners in many of the Cleantech industries to quickly access know-how
→ What is your strategic posture?
Where is your Cleantech master plan?
SOURCE: McKinsey

Energy plays a key role in 40% of the global economy

2008 worldwide revenues, EUR billions





SOURCE: Global Insight; World Industry Monitor, February 2009; McKinsey report, "Wettbewerbsfaktor Energie"

The energy crisis and climate change are forcing politicians and industry to act on energy efficiency

Energy efficiency discussion driven by 3 underlying issues

High energy prices in long term

- Energy prices volatile, but increasing in long term, e.g., by 2.5 - 3.5% p.a. for German industry
- Driver: sharply increasing demand for primary fuels, especially in developing regions

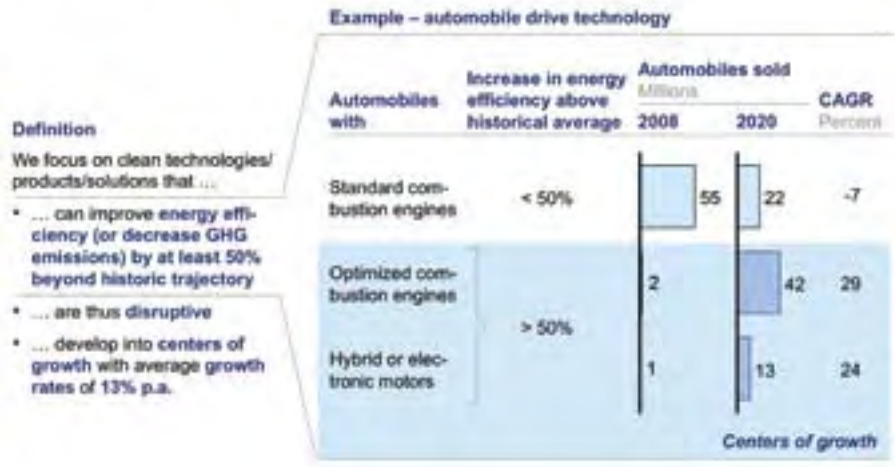
Concentration of supply

- Indigenous local resources being depleted, e.g., EU gas supply will shrink by 15 - 20% by 2020
- Remaining resources increasingly under political control of exporting countries

Climate policy objectives

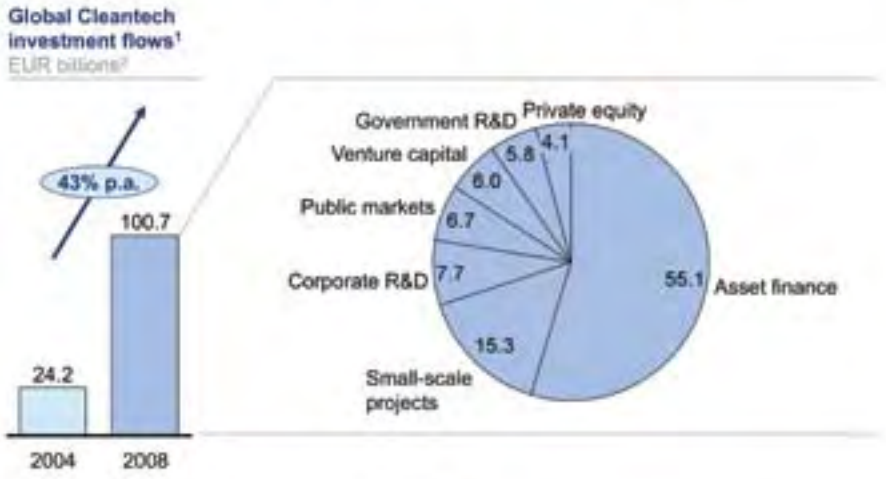
- Challenging national targets for energy efficiency, e.g., in Germany and the US
- EU CO_2 trading schemes will likely be extended to more industries; long-term CO_2 prices climbing

Our definition of clean technologies – Cleantech – and respective centers of growth



SOURCE: McKinsey report, "Wettbewerbsfaktor Energie"

Already in 2008, over EUR 100 billion investments flowed into the Cleantech sector across all asset classes worldwide



1 Excluding M&A and MBO deals
2 USD converted to EUR with exchange rate of 0.71 EUR/USD

SOURCE: World Economic Forum report, "Green Investing 2009"

C Innovative financing models – Berlin Energy Agency aligns investment and benefits for building retrofitting

- Berlin Energy Agency **manages retrofits** of large buildings
- Example projects include schools, offices, hospitals, and residential buildings
- **Public-private partnership** of city of Berlin, Vattenfall and KfW (Federal Promotional Bank)
- Program already **transferred to several ECA cities**

Project approach

Berlin Energy Agency
- Acts as project manager
- Pools buildings and negotiates contracts

Building owner

- Guarantees energy savings of > 25%
- Assures financing of retrofit

- Pays 80 - 97% of achieved energy savings until retrofit is paid back (8 - 12 years)

Energy systems company, e.g., equipment supplier

Key benefits

- No up-front investments
- Professional retrofit plan leveraging full savings potential
- Positive cash flow from energy savings from day 1
- New business generated through endorsement of Berlin Energy Agency
- Additional revenues if retrofit measure more effective than planned

SOURCE: Berlin Energy Agency

D Energy contracting models can bridge high up-front costs

SIEMENS

Energy contracting example, Siemens Building Technologies

Both customer and contractor benefit from energy savings ...

... creating a win-win situation

Contractor ✓
- Makes investment for energy-saving measures
- Receives payment within guaranteed amortization period

Customer ✓
- Does not need to pay for up-front investment
- Does not assume any risk
- Benefits from any upsides of energy savings

Contracting model transformed business from selling mere **equipment** to selling energy efficiency **service**

SOURCE: Siemens Building Technologies

Innovative Financing for EE and RES Projects

Nenand Pavlovic, Deputy Managing Director, South Eastern Europe Consultants
nenad.pavlovic@seec-bg.com

Mr. Pavlovic focused his presentation on the experience of the Western Balkans and Uzbekistan. In this context, he stated that the major framework conditions (e.g. energy policy and strategy, energy carrier prices, privatization, service market, EE product market) are better developed in the Western Balkans countries than in Uzbekistan.

Major framework conditions

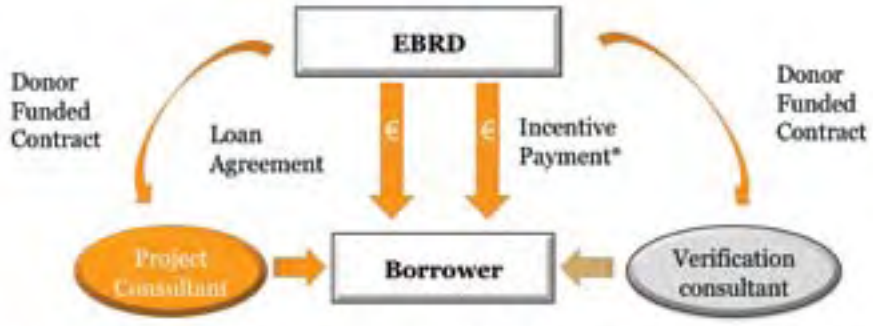
• Energy Policy & Strategy	Yes
• Secondary legislation	Yes/No, but mostly not in place
• Feed In Tariffs	Yes, mostly
• Energy carrier prices	Almost/Cost reflective
• Primary energy resources	Poor
• Financial IEE schemes	Yes, available
• Privatization	Mostly done
• Service market	Not enough developed, TA needed
• EE product market	Developed
• Energy Policy & Strategy	No
• Secondary legislation	Not in place
• Feed In Tariffs	No
• Energy carrier prices	No cost reflective (Gas only 50 US$/1000 m3)
• Primary energy resources	Gas, huge reserves
• Financial IEE schemes	In preparation
• Privatization	Not completed
• Service market	Not enough developed, TA needed
• EE product market	Developing

Energy Efficiency in Public Buildings (SER, MNE; WB)

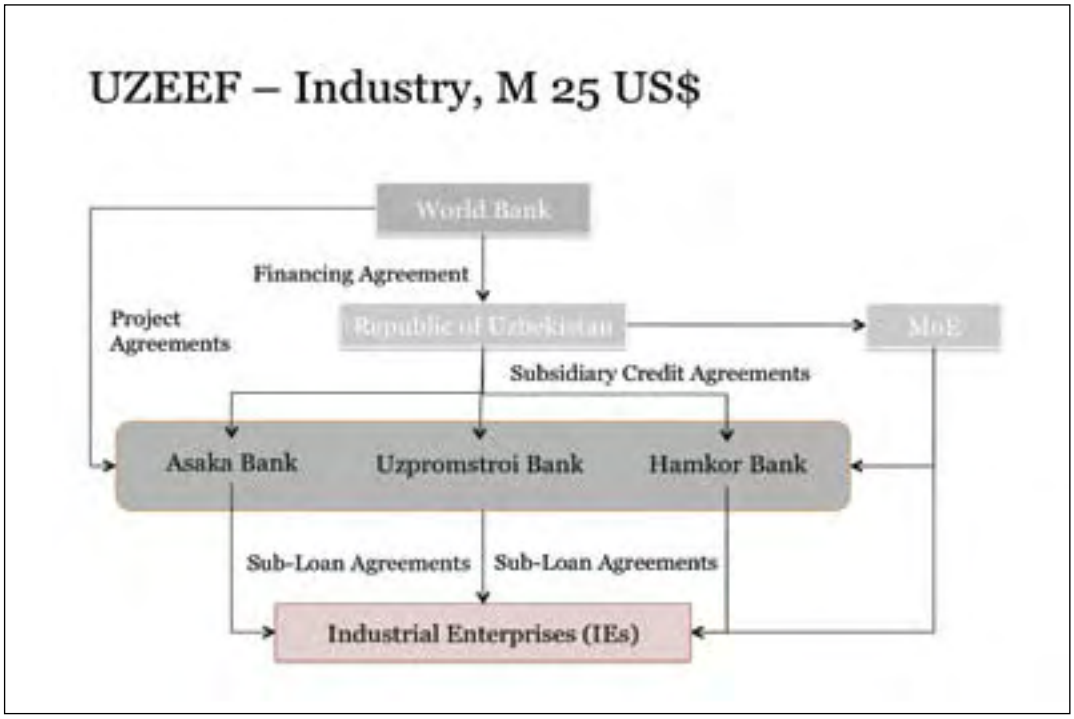
Traditional Credit Lines (EBRD, KfW, IFC, etc.)

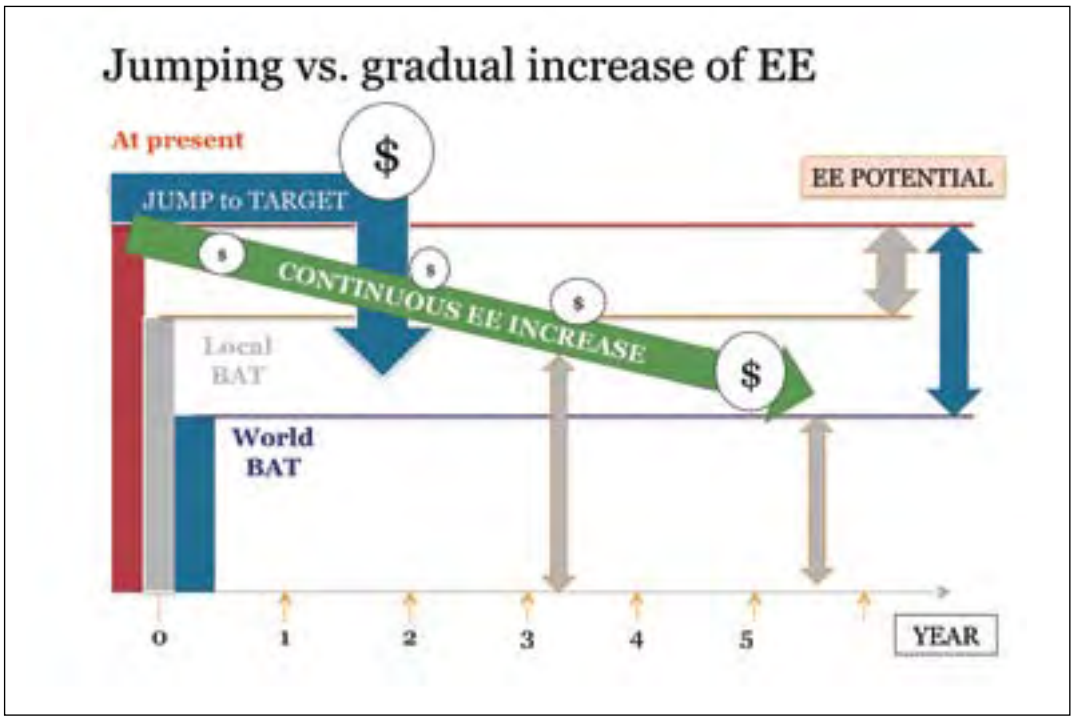
- *IFIs do not want to destroy local financial market*
- Typically hire project and verification consultant
- Credit conditions are similar at the local commercial market with some benefits (longer maturity or grace period, for instance)

WeBSEDFF (EBRD) – http://websedff.com



- *Incentive payments will be paid upon technical completion of the investments to eligible Borrowers*
- CO_2-based Incentive Payments
- IP = CO_2 emissions avoided per year x Price per ton of CO_2 x Annuity factor (depending on discount rate and number of years over which CO_2 emissions reductions will be remunerated


UZEEF – Industry, M 25 US$
World Bank
Financing Agreement
Project Agreements
Republic of Uzbekistan
MoE
Subsidiary Credit Agreements
Asaka Bank
Uzpromstroi Bank
Hamkor Bank
Sub-Loan Agreements
Sub-Loan Agreements
Industrial Enterprises (IEs)

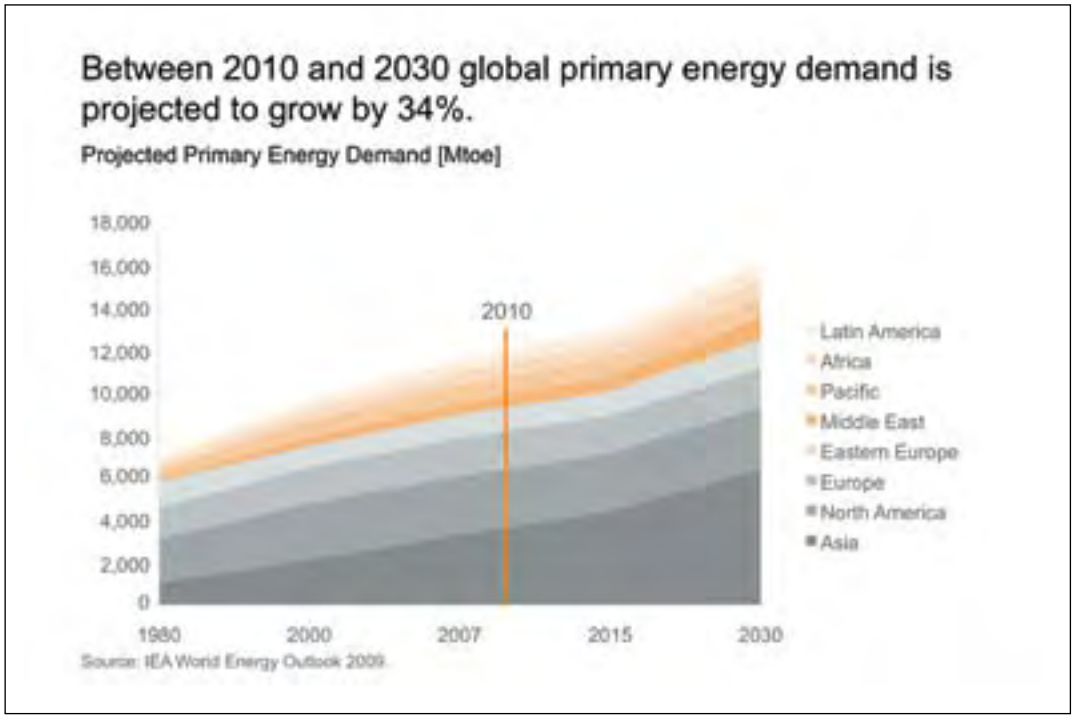

Jumping vs. gradual increase of EE
At present
$
JUMP to TARGET
EE POTENTIAL
CONTINUOUS EE INCREASE
Local BAT
World BAT
0
1
2
3
4
5
YEAR

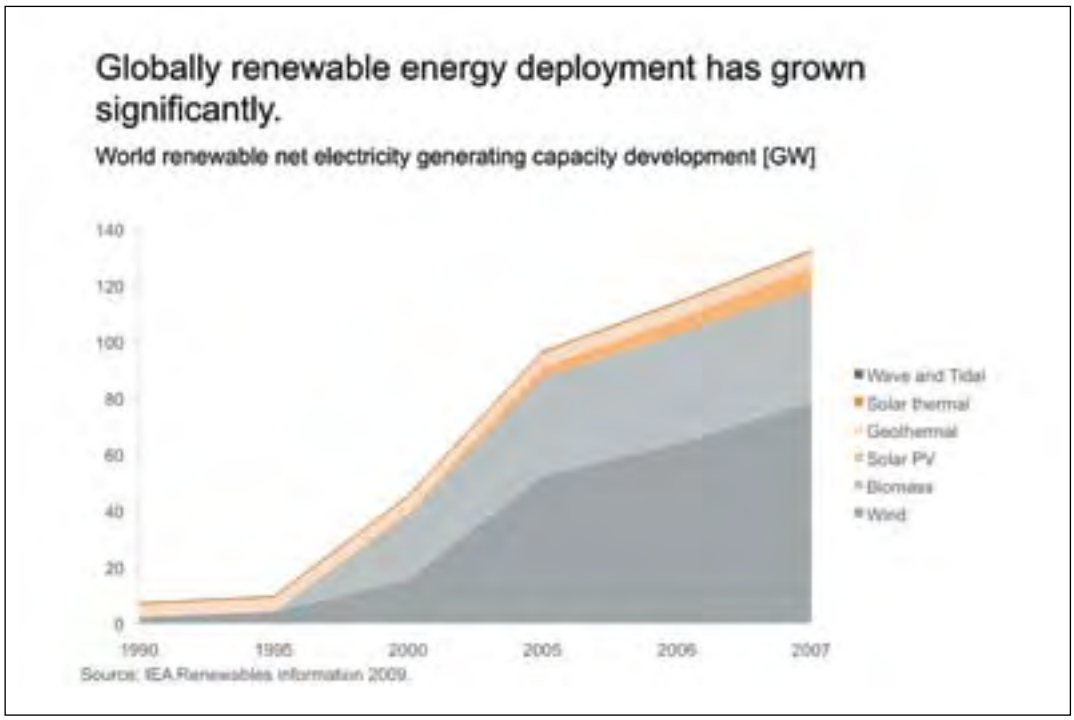
Challenges

- Outdated and life spent of both production and energy technologies
  - Large technical potential for EE improvement
  - Energy carrier prices not cost reflective – smaller market potential
  - Difficult to make distinction between IEE vs. refurbishment, replacement, production extension - misunderstandings
- Faster EE product penetration than development of new services
- Commercial banks still treats these markets as high risks area -> expensive loans – TA for development of new product 'IEE loan'
- Privatization ongoing – focus on renewal of physical production, not on energy and IEE; faster development of service market – TA needed!
- Oversized capacities – real challenge how to structure the approach
- Demand Side Management in factories – demand is high !
- Training of consultants (EA, BP, BAT, etc.) – demand is high

Growth Opportunities in the Cleantech Industry
Nikolai Dobrott, Managing Partner, Apricum - The Cleantech Advisory

Nikolai Dobrott stated that the global primary energy demand was projected to grow by 34% between 2010 and 2030. Globally, the deployment of renewable energy has significantly grown over the past years. According to Dobrott, the promotion of clean technologies represents a highly attractive opportunity to meet future energy challenges. In this context, the advantages of clean technology include lower dependency on fossil fuels, energy security through a diversified energy mix, decentralized energy supply and cost-effective opportunities for rural electrification, highly reduced CO_2 emissions, and the creation of a local growth industry with qualified jobs. With regard to Germany, Nikolai Dobrott found that renewable energies had become a significant industry with more than 290,000 jobs (in 2009). He also referred to the Eastern German "Solar Valley" as an example for successful cluster development. According to Dobrott, the development of self-sustaining clean-tech clusters should follow a three-way approach focusing on domestic demand, local manufacturing as well as R&D.


Between 2010 and 2030 global primary energy demand is projected to grow by 34%.
Projected Primary Energy Demand [Mtoe]
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2010
1980
2000
2007
2015
2030
Latin America
Africa
Pacific
Middle East
Eastern Europe
Europe
North America
Asia
Source: IEA World Energy Outlook 2009


Globally renewable energy deployment has grown significantly.
World renewable net electricity generating capacity development [GW]
140
120
100
80
60
40
20
0
1990
1995
2000
2005
2006
2007
Wave and Tidal
Solar thermal
Geothermal
Solar PV
Biomass
Wind
Source: IEA Renewables Information 2009

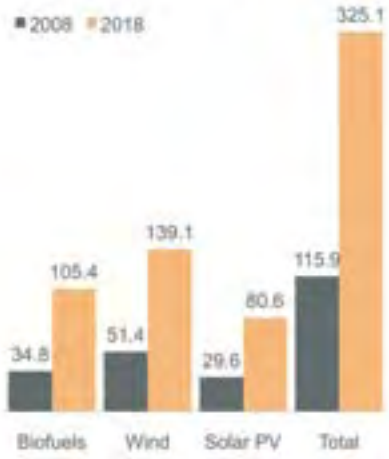
Promoting clean technologies represents a highly attractive opportunity to meet future energy challenges.

Advantages of clean technologies

- Less dependency on fossil fuels and prices
- Energy security through diversified energy mix
- Decentralized energy supply and cost-effective opportunities for rural electrification
- Highly reduced CO_2 emissions and opportunity for CDM projects
- Creating a local growth industry
- Qualified jobs

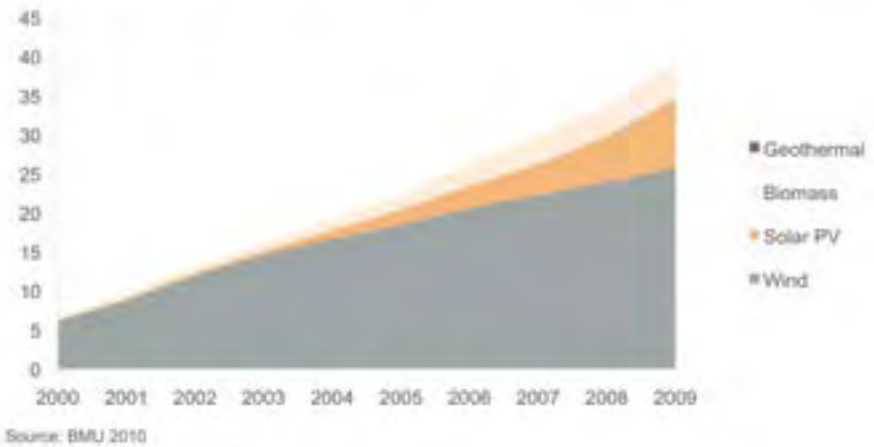
Source: Clean Edge 2009

Global renewable energy market size in 2008 and 2018e [billion USD]



Within ten years installed renewable capacities in Germany have almost quadrupled.

Cumulative installed capacities [GW]



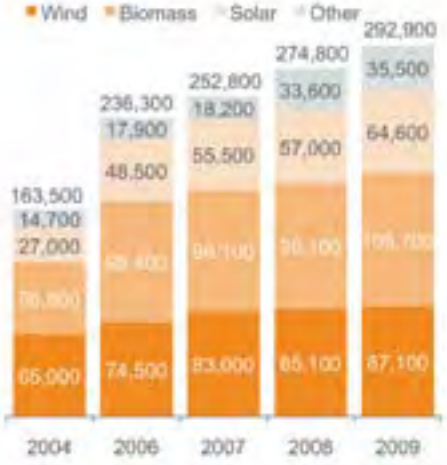
Source: BMU 2010

Renewable energies have become a significant industry in Germany.

Renewable energies in numbers (2009)

- 16.1% of electricity consumption
- 8.4% of heat production
- EUR 17.7 bn investment in new installations (+19.4%)
- EUR 33.4 bn in revenues (+8.9%)
- 292,900 jobs in total

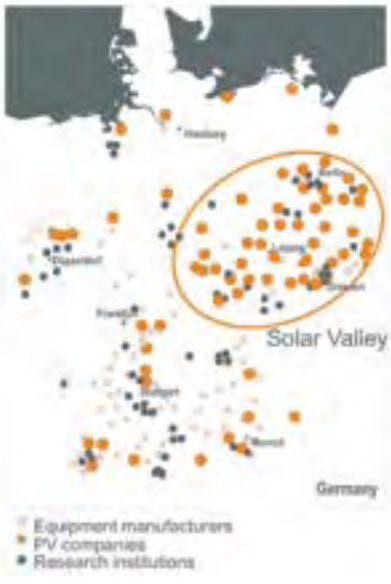
Job development in the renewable energy sector 2004–2009



Source: BMU 2010

The eastern German 'Solar Valley' – an example for successful cluster development.

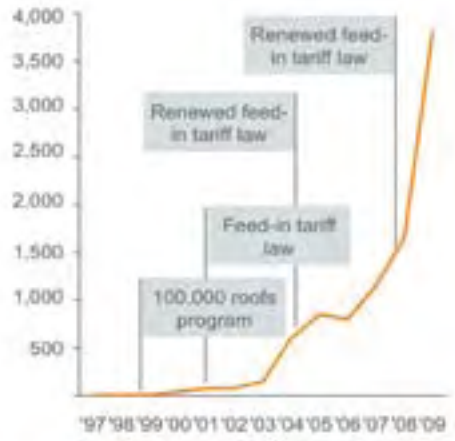
- Area: 108,585 km²
- Inhabitants: ~16 million (1/5 of Germany's total; incl. 3.5 million in Berlin)
- Eastern Germany features the world's largest PV industry cluster:
  - Wafer-based technology: 28 companies with a production capacity of more than 3,7 GW
  - Thin-film technology: 26 companies
  - Equipment suppliers: 13 large companies
  - Research: several world-class institutes
  - Education: several universities and colleges with solar-specific courses
  - Approx. 15,000 direct employees



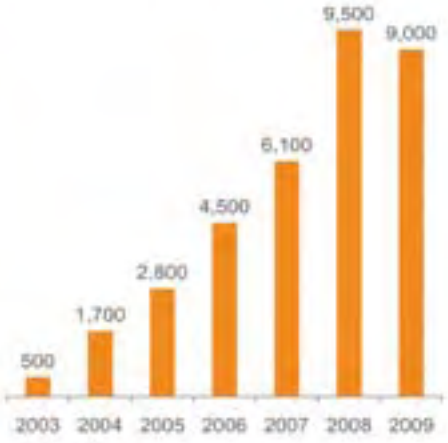
Source: Germany Trade & Invest 2009.

By implementing effective policy measures, Germany has taken the lead in solar energy within a few years.

Annually installed PV capacities [MWp]



PV industry turnover development [m EUR]



Source: BMU 2010.

Best practice example for short term policy measures: 100,000 roof program in Germany.

Key data of the program

Duration: 5 years (Jan. 1999 – Dec. 2003)

Effects:

- Generated 345 MW of installed capacity, almost 100% of total PV growth during this period
- 73,787 loans supported
- Total loan volume: EUR 1.6 bn.

Costs: ca. EUR 250 million

Policy design:

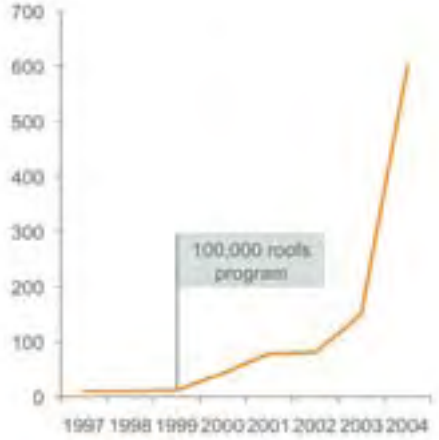
- Long maturity loans with low interest rates: 1.9% p.a. undertaken by state-owned KfW bank

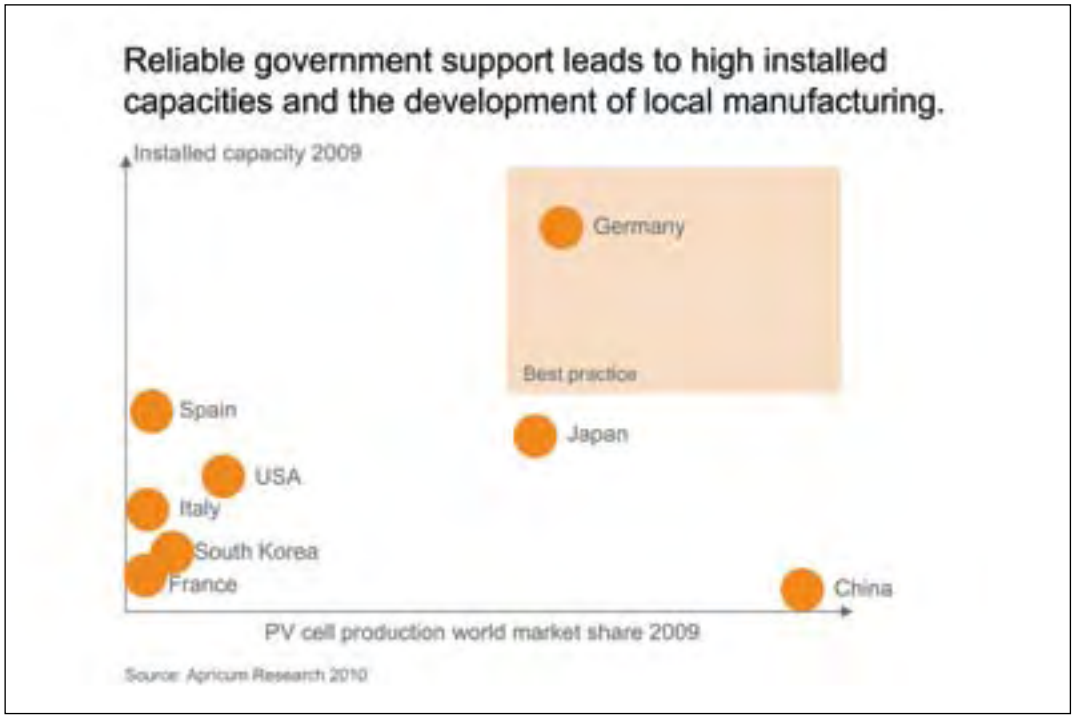
Further policy measures during program:

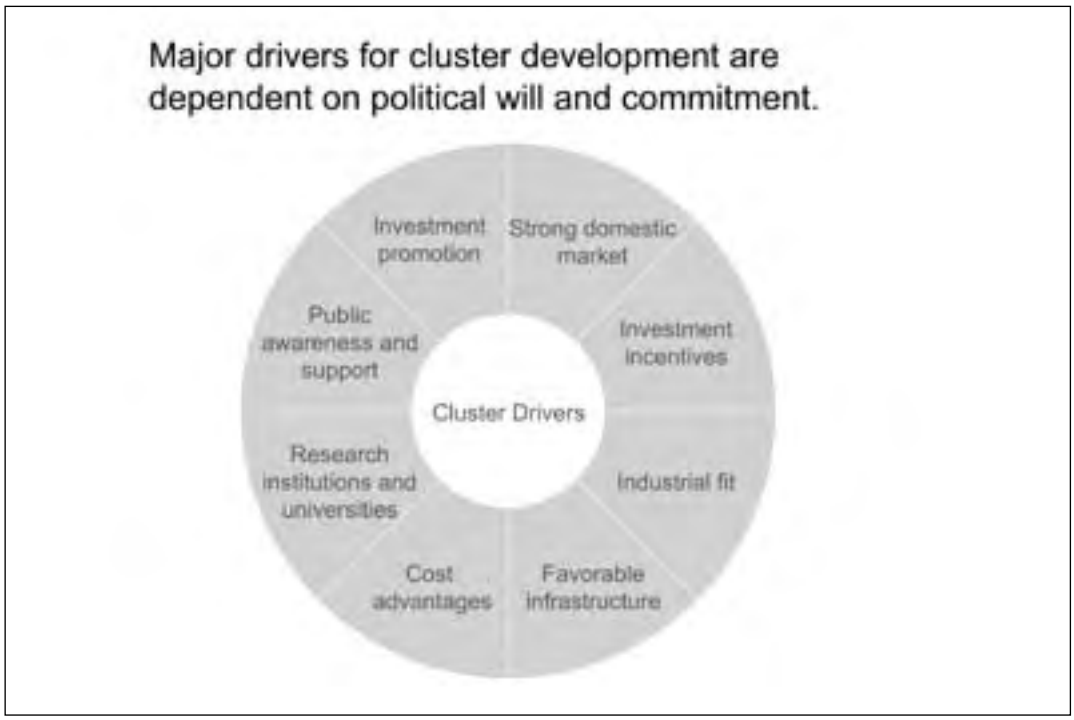
- Renewable Energy Sources Act (2001)

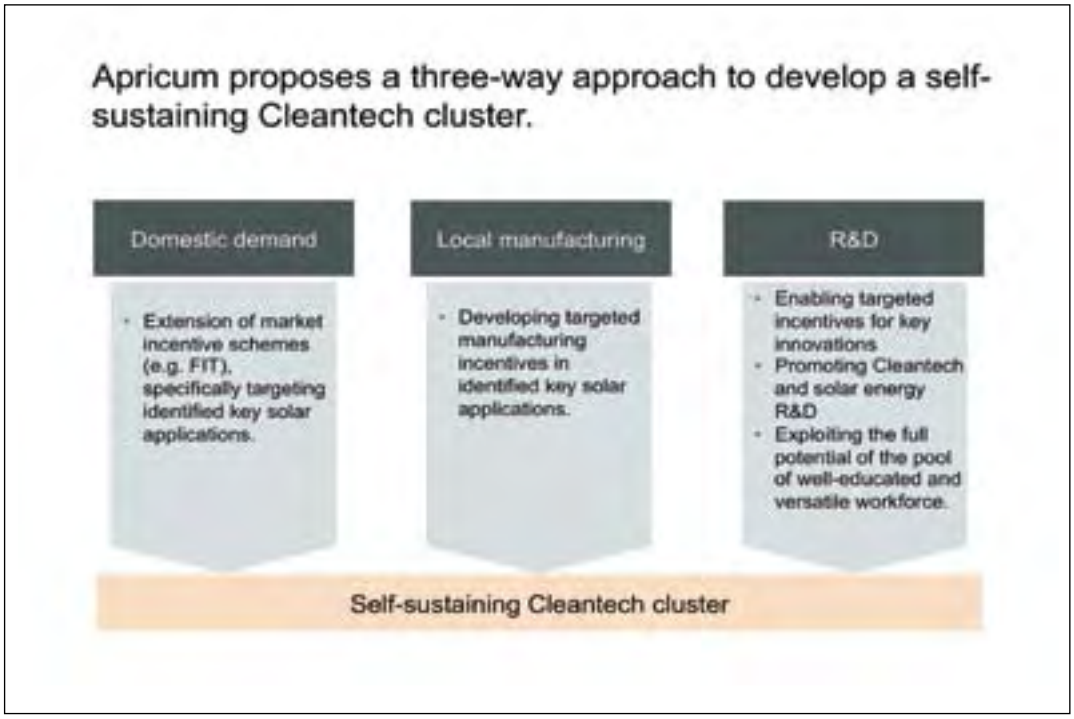
Source: Agricum Research 2010

Annually installed PV capacities [MWp]

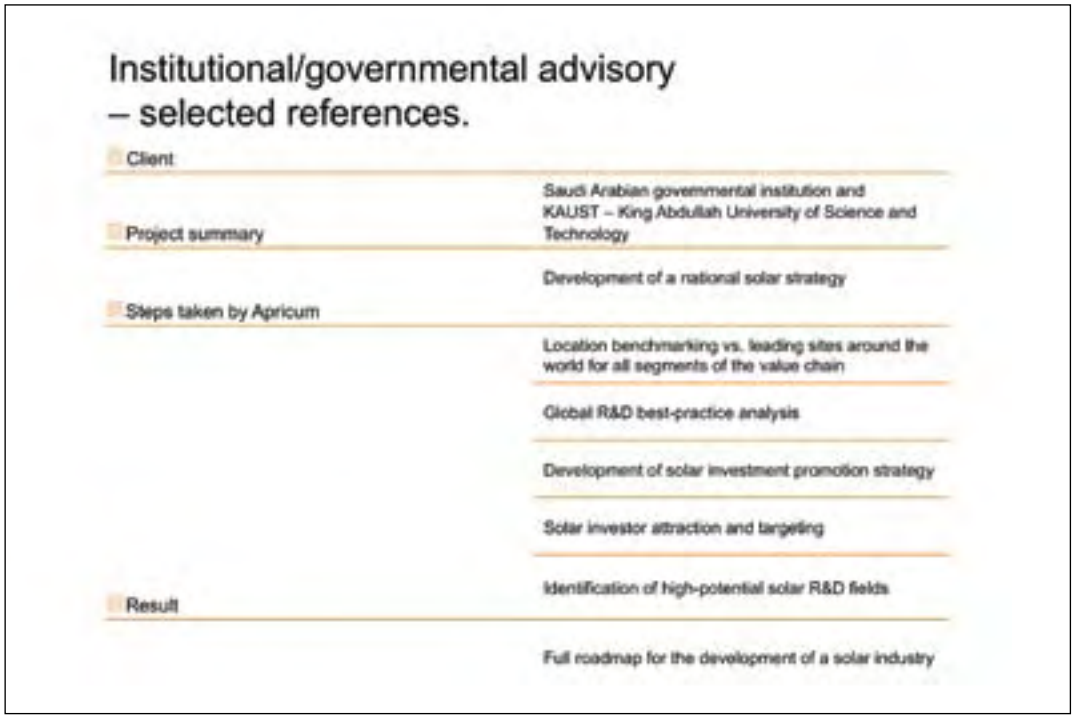


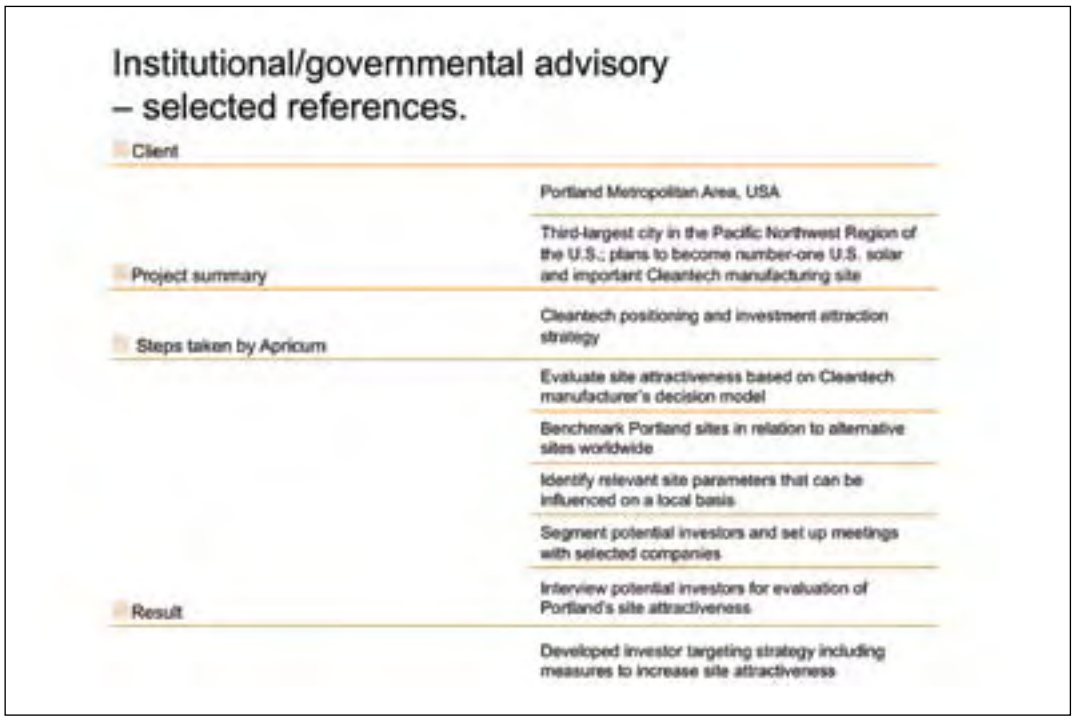

Reliable government support leads to high installed capacities and the development of local manufacturing.
Installed capacity 2009
Germany
Best practice
Spain
Japan
USA
Italy
South Korea
France
China
PV cell production world market share 2009
Source: Apricum Research 2010


Major drivers for cluster development are dependent on political will and commitment.
Investment promotion
Strong domestic market
Public awareness and support
Investment incentives
Cluster Drivers
Research institutions and universities
Industrial fit
Cost advantages
Favorable infrastructure


Apricum proposes a three-way approach to develop a self-sustaining Cleantech cluster.
Domestic demand
Extension of market incentive schemes (e.g. FIT), specifically targeting identified key solar applications.
Local manufacturing
Developing targeted manufacturing incentives in identified key solar applications.
R&D
Enabling targeted incentives for key innovations
Promoting Cleantech and solar energy R&D
Exploiting the full potential of the pool of well-educated and versatile workforce.
Self-sustaining Cleantech cluster


Apricum has the experience and strength to support your location in cluster development.
Global Cleantech industry and market expertise competency
experience in economic development:
Thorough understanding of industry requirements for market entry, location analysis and site selection
Excellent connection to industry players worldwide
Experts in investment promotion and cluster development including market and manufacturing incentive schemes
Consultancy project record for states and regions in Germany, USA and Middle East
International team of experienced consultants
Country representative in emerging markets

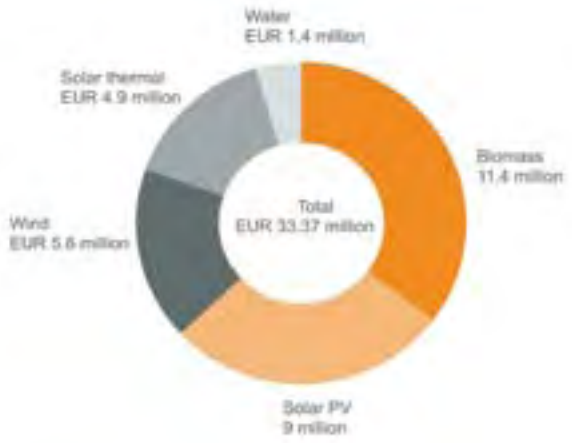

Institutional/governmental advisory
– selected references.
Client
Saudi Arabian governmental institution and KAUST – King Abdullah University of Science and Technology
Project summary
Development of a national solar strategy
Steps taken by Apricum
Location benchmarking vs. leading sites around the world for all segments of the value chain
Global R&D best-practice analysis
Development of solar investment promotion strategy
Solar investor attraction and targeting
Result
Identification of high-potential solar R&D fields
Full roadmap for the development of a solar industry


Institutional/governmental advisory
– selected references.
Client
Portland Metropolitan Area, USA
Third-largest city in the Pacific Northwest Region of the U.S.; plans to become number-one U.S. solar and important Cleantech manufacturing site
Project summary
Cleantech positioning and investment attraction strategy
Steps taken by Apricum
Evaluate site attractiveness based on Cleantech manufacturer's decision model
Benchmark Portland sites in relation to alternative sites worldwide
Identify relevant site parameters that can be influenced on a local basis
Segment potential investors and set up meetings with selected companies
Interview potential investors for evaluation of Portland's site attractiveness
Result
Developed investor targeting strategy including measures to increase site attractiveness

Institutional/governmental advisory – selected references.

Client	Economic development agency of the German Federal State of Saxony
Project summary	Develop investor attraction strategy for selected Cleantech industry segments
Steps taken by Apricum	Analyze market potential of selected Cleantech segments
	Evaluate attractiveness of Saxony as investment location, benchmark against worldwide investment locations
	Derive target segments, i.e., most attractive Cleantech segments for investment attraction
	Develop investment attraction strategy and derive USP
	Identify potential investors in target segments and profile identified potential investors
Result	Investment attraction strategy completed within eight weeks; prepared client to approach investors in subsequent phase, assisted by Apricum

Renewable industries turnover in Germany (2009).



Source: BMU 2010

Capacities vs. cell production share 2009.

Country	Main market support scheme	Cumulative PV capacity (2009)	World market share PV cell production (2009)
Germany	Uncapped FIT (since 1991)	9,100 MW	15.0%
Spain	Capped FIT (since 2008)	3,500 MW	1.0 %
Japan	FIT (since 2008)	2,640 MW	12.6 %
USA	Tax credits, RPS (since 2006)	1,380 MW	4.4 %
South Korea	Capped FIT (uncapped until 2008)	453 MW	1.9 %
Italy	Capped FIT (since 2005)	900 MW	0.7 %
China	Capped regional tendering processes (since 2010)	200 MW	38.0 %
France	FIT (since 2009)	285 MW	0.4 %

Promoting the Energy Agenda

Eicke Weber, Director, Fraunhofer Institute for Solar Energy Systems (ISE)
eicke.weber@ise.fraunhofer.de

Prof. Dr. Eicke Weber introduced the work of the Fraunhofer Institute for Solar Energy Systems (ISE) and the Fraunhofer Energy Alliance. In his opinion, the transformation into a green energy future requires increased energy efficiency in buildings, transport and production, rapid development of all renewable energies towards a 100% renewable energy future and the expansion of the electricity grid for long-distance transport and interested consumers.

Fraunhofer-Institute for Solar Energy Systems ISE

Largest European solar energy research institute

>930 members of staff (incl. students)

10% basic financing
90% contract research
40% industry, 60% public
€ 56 M total budget ('09)
> 10% p.a. growth rate

Areas of business:

- Photovoltaics
- Solar Thermal Technologies
- Renewable Power Generation
- Energy-Efficient Buildings and Technical Building Components
- Applied Optics and Functional Surfaces
- Hydrogen Technology

Fraunhofer Alliance Energy

Strong German research network of 14 institutes in energy efficiency and renewable energy technologies

- Partnership of Fraunhofer Center for Sustainable Energy Systems CSE in Boston with Massachusetts Institute of Technology (MIT), Cambridge, MA

Customer's benefits

- New technologies for energy and efficiency
- Innovative and intelligent energy concepts
- Strengthened competitiveness and success in the market

We are Facing the Urgent Challenge of a Drastic Change in our Global Energy System

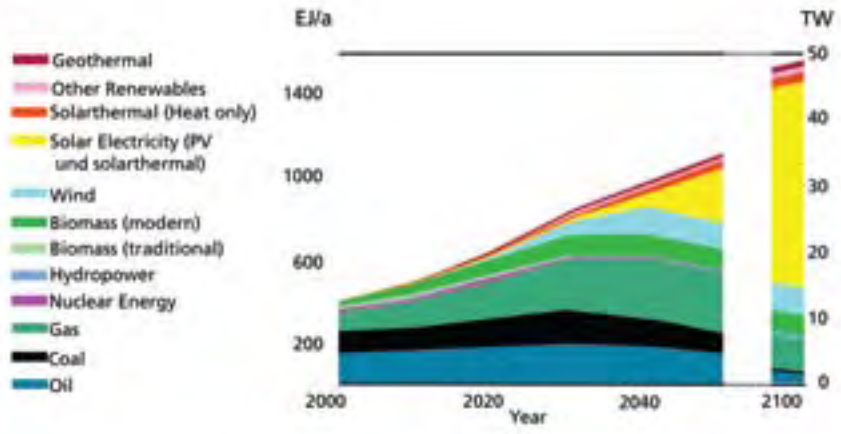
- Protection of the foundation of life as-we-know-it by fast reduction of CO_2 emissions
- Limitation of fossil energy leads to increasing energy prices
- Reduction of geopolitical conflict potential based on fossil fuels

The Transformation into a Green Energy Future Requires:

- Increased energy efficiency in buildings, transport (e-mobility) and production
- Rapid development of all renewable energies, especially wind, PV, ST, hydro, geothermal and biomass towards a 100% renewable energy future
- Expansion of the electricity grid for long-distance transport and smart consumers

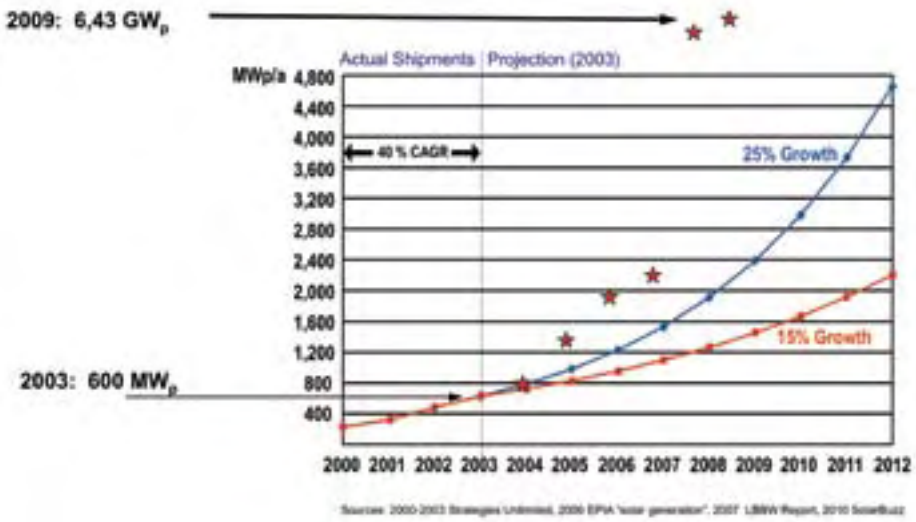
- My suggestion for climate discussion:
  Replace CO_2 reduction targets by Renewable Energy introduction targets!

Exemplary Path, Global Primary Energy Consumption

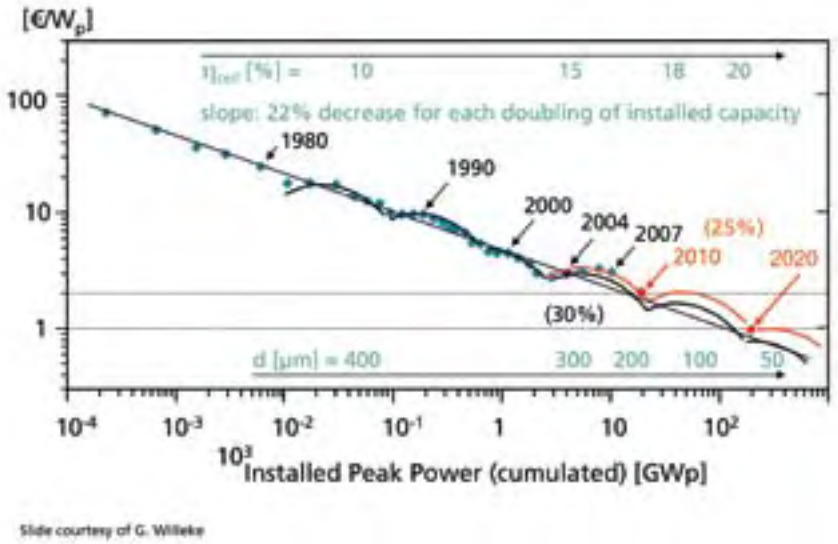


Source: German Advisory Council on Global Change, 2003, www.wbgu.de

Annual Installation of PV Modules (worldwide)



Learning Curve of Crystalline Si PV Module Prices

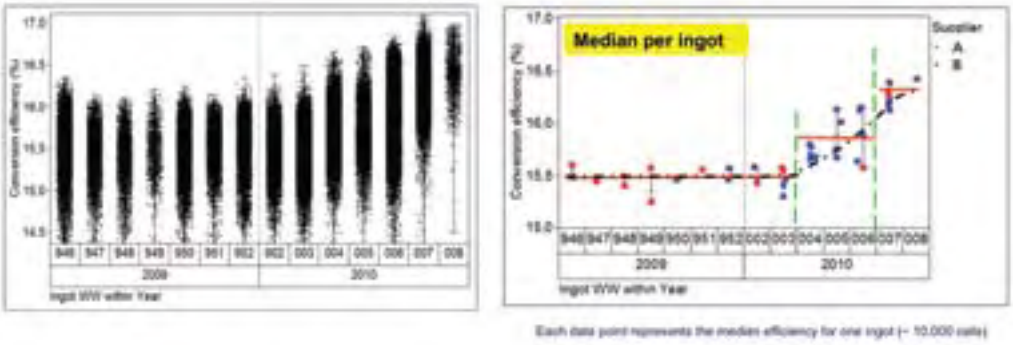


Slide courtesy of G. Willeke

From mg-Si to Ultrapure poly-Si: the Siemens Process

Alternative Technology for PV:
upgraded metallurgical Si, umg-Si, without using the gas phase

Solar Cell Conversion Efficiency with 100% umg-Si

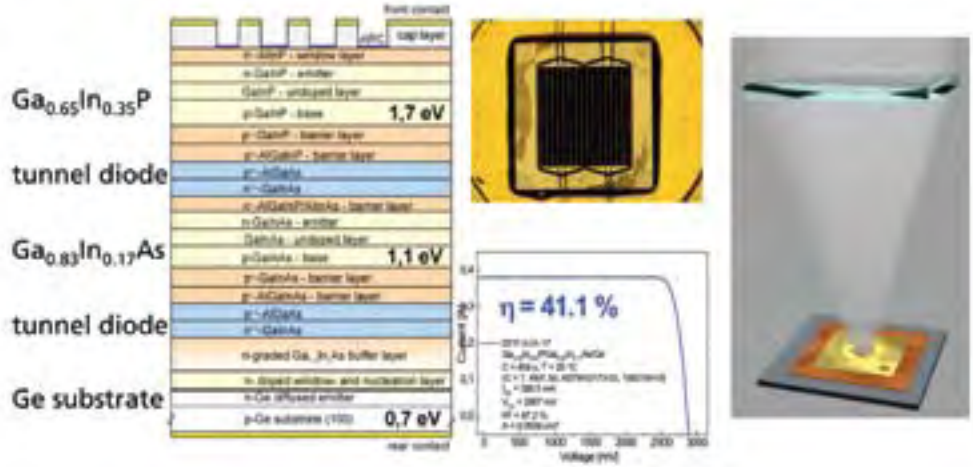


Each data point represents the median efficiency for one ingot (~ 10,000 cells)

- Median efficiency reaches 16%
- Record cells approaching 17%

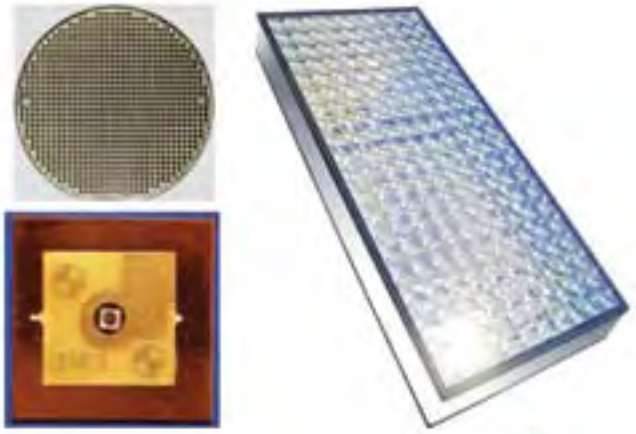
Slide courtesy of CalSolar

High-Efficiency ISE Triple-Junction Solar Cells



Realization : FLATCON® System by Concentrix

- III-V based tandem cells
- C_{geo} = 500x
- Point focus Fresnel lenses
- Housing made of glass



Concentrix solar

Desertec - Vision of an Electricity Super Grid

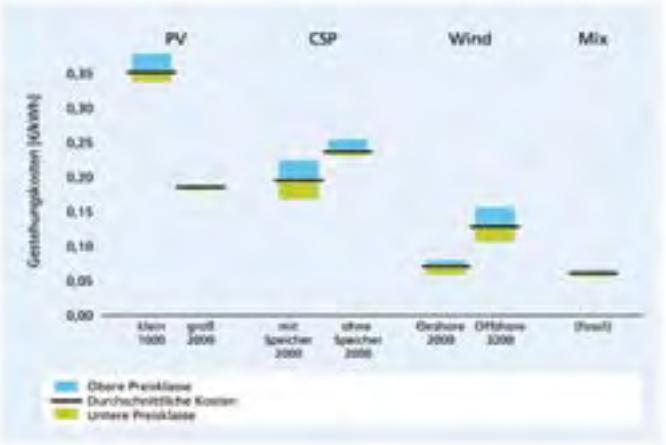
Intelligent Use of Energy (Smart Grids)

Future Structure of Electricity Supply: Supergrid with distributed Responsibilities

- Command Unit Distribution Operation
- Intelligent Grid Operation
- Prognosis: Generation and Consumption

Electricity Costs of Renewable Energies

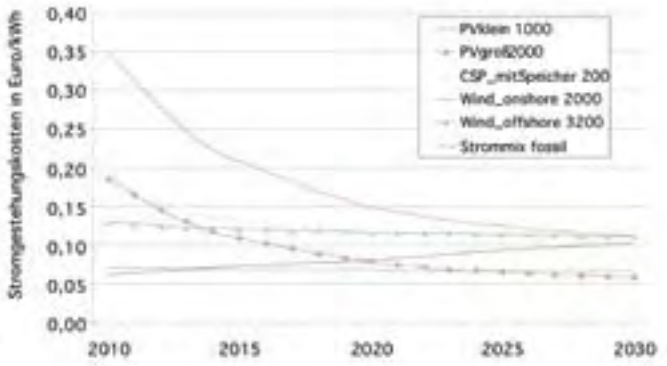
- Electricity Costs depend on number of operating hours
- On-shore wind reaches parity with fossil energies
- PV at good locations competitive with CSP



Slide courtesy of C. Kost (Fraunhofer ISE)

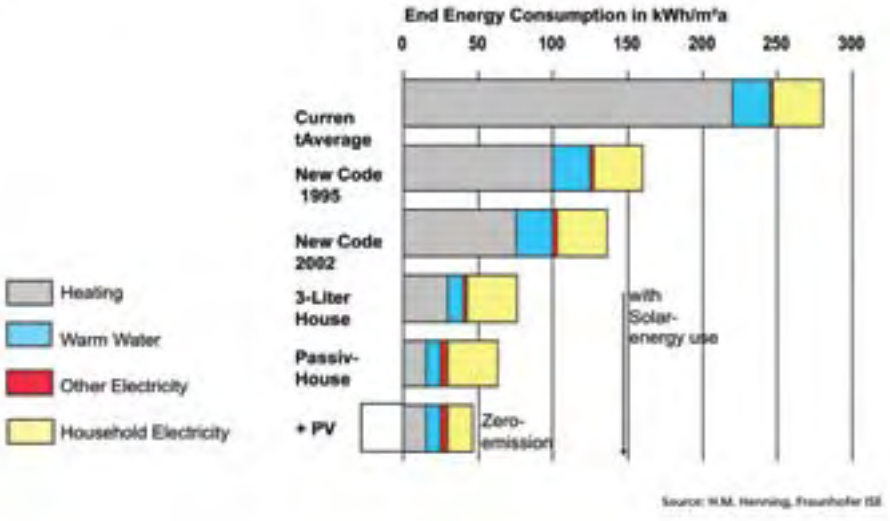
Electricity Cost and Learning Curve Prediction

- Steep PV learning curve results in costs that are competitive with conventional sources
- (Onshore-) wind is competitive today
- Offshore- wind has susbtantially higher costs, even long-term



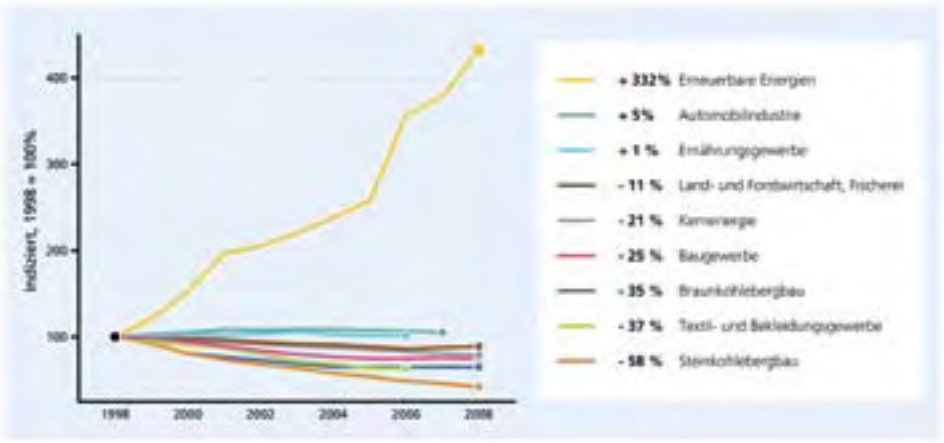
Source: C. Kost, Fraunhofer ISE

Energy Use of Residential Buildings



Source: W.M. Henning, Fraunhofer ISE

Employment in Selected Industries in Germany 1998-2008



Quellen: Statistisches Bundesamt, Statistik der Kohlewirtschaft, BMU, Atomforum, VDA, Stand: 4/2009

Conclusion: The Green Energy Future

- The world is moving towards a green energy future; the open question is, how fast will we come there
- The goal is 100% renewable energy generation at greatly increased efficiency in energy consumption
- This transition of the global energy market provides exciting opportunities to transfer innovation into jobs
- Countries that blaze this trail will have great economic advantages in the form of stable energy prices and jobs in high- and low-tech sectors
- Fraunhofer institutes are ideally prepared to work with research institutions and industry in ECA countries to accelerate this exciting development

IMPRESSUM

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